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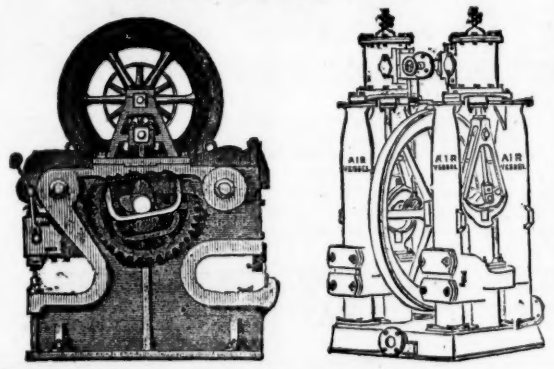

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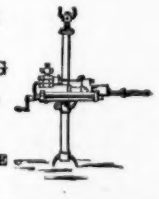

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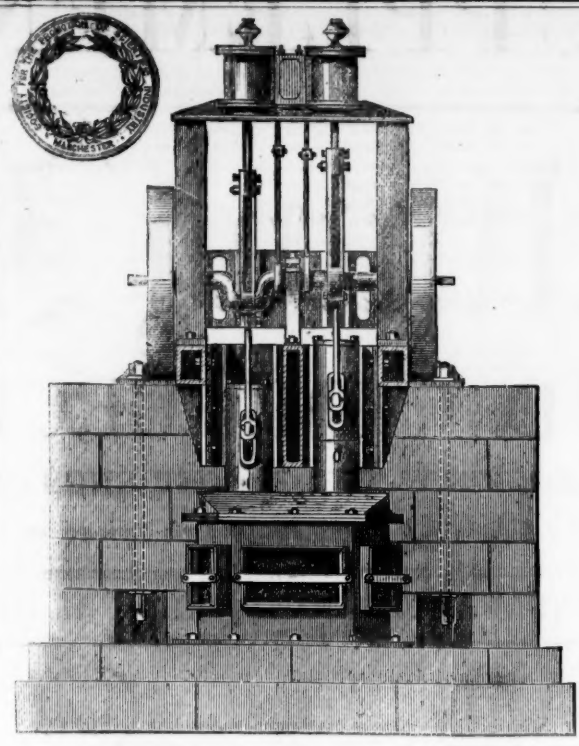

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THE WATT—CORNISH PUMPING ENGINE.

SIR,—The world-wide renown which this engine has acquired has, it is supposed, been on the decline of late years, and, in fact, has been commented on very freely in some quarters, much to the *ennui* of the Cornish engineers of this generation, which I think when we have examined the most prominent features of the case will not only turn out to be a very unjust imputation, but that in reality the reverse is the case, and that the apparent decline in the duty of the engine has arisen from a force of circumstances over which the engineers of the present age have had no control. At the time the engines were supposed to be doing higher duty the pressure in the boilers ranged from 15 to about 25 lbs. per inch, the whole effective force of which was utilised by expanding it down to the pressure necessary to overcome the friction of the engine and pitwork, so that no effective pressure was exhausted, and hence in a measure the high duty attained. Of late years the advantage of using a higher pressure, and expanding it down to a similar point, has been fully proved by experiment, and appreciated by all the most eminent engineers of the world, and the Cornish engineers have endeavoured to utilise this advantage in this engine, and have succeeded to a certain extent in realising and maintaining it, until the engines have become gradually overloaded by the increasing depth of the mines, which has very naturally brought about the necessity of exhausting effective pressure, and hence in a measure the decline in the duty. The engineers, to remedy this, would put in larger cylinders, but they are told by some that the mines are too poor, and by others it would have the contrary effect, so that through the poverty of the mines and the ignorance of some of the managers of the properties of steam, the engineers have acquired in a measure the unjust reputation of having caused a decline in the duty of the engines, whilst in reality they have made very important improvements in it. The old pistons which required packing nearly every week to keep them steam tight have been replaced by one that requires packing only once in six months, and similar important improvements have been made in the valves and stuffing boxes, and a steam envelope has been applied to the cylinder to prevent condensation within, which has resulted in economising a great waste of steam, caused formerly by the leaking of the piston and valves, the airing at the stuffing boxes, condensation in the cylinder, and the consequent imperfect vacuum. The engine, it must be borne in mind, possesses moreover peculiarities which do not admit of realising the same advantage that rotary engines derive from a high rate of expansion. The enormous weight which would be abruptly set in motion by its use renders it very objectionable if not impracticable; it amounts in some cases to as much as 360 tons, including engine, main rod, connections, and balance bobs, so that against the advantage to be derived from it there is a set off arising from the extra strength and weight of the engine and pitwork required to resist this strain of abruptly starting the mass into motion, which tends greatly to limit its use in this engine, and as a rule the steam is cut off at a point ranging between ¼ and ⅛ stroke, although there are a few working at a much higher rate of expansion, and in one case in Cornwall it was carried to the extreme of causing a total smash up of the engine; in this case it was cut off at about ⅛ stroke. Taking, then, the risk of breakage into consideration very little benefit can be derived from expansion in this engine.

Another very serious drawback on the duty is the imperfect manner in which pumps are fixed, owing partly to crooked shafts and partly to the drafting away or rather driving away the best of the workmen to foreign countries through the unjust and absurd system in England of paying good and bad men the same wages. In many cases the engineers have no control over this important part of their work, which is entrusted solely in some mines to the agents and pitmen, who are as a rule far less competent in this class of work than the engineers, who undoubtedly if allowed to make plans of the shaft and pitwork, crooked as they are, would immediately increase the duty of the engine to a very considerable extent. The amount of friction in any shaft can be easily proved where there is sufficient balance bob power to balance the rod when the pump columns are empty by ascertaining the pressure necessary to keep it in motion without lifting water, and then ascertained the pressure required to keep the engine in motion when detached from the pitwork; this would settle the question of the friction of the pitwork and engine, and then by ascertaining the pressure necessary to work the engine with the pumps lifting, and placing a water meter to measure the quantity of water discharged, the effective duty of the engine and friction of water in the pipes could be easily established. In some old pumps incrustation has become so thick that the passage of the water is enormously contracted, causing tremendous friction in the flow of the water. It is, therefore, highly important that these tests should be made, which would no doubt trace the apparent low duty of the engines in a great measure to these causes. A water meter should also be attached to the feed pipe, which would indicate the quantity of water delivered to the boilers, and enable the managers to test the quality of coals, and the serious loss incurred by working dirty boilers. The engine is precisely of the same form as it was formerly, excepting the improvements above mentioned, and sundry ameliorations in the gear work. The boiler is also precisely of the same form, excepting a great improvement in its construction, requiring a thinner tube for the same strength than it did formerly, which, of course, has increased its economic evaporative power.

Another great drawback on the duty is the inferior quality of coals which has come into use of late years. Formerly there were tremendous accumulations of slack coals on the coal mines, there being no sale for it then, but since it has become comparatively dear nearly the whole lot has been used up, so that the engineers make a very just defence when they attribute the decline of the duty in a great measure to the decline in the quality of the coals, because they have in reality been burning the refuse of their ancestors. The quality of steam coals, then, has been very evidently reduced to a comparatively low grade to what it was formerly, but a little improvement may be expected now the old stocks are used up, and there is only the daily output of low grade stuff to consume. Another apparent decline in the duty arises from the old method of pumping and calculating the duty. Drawing lifts were very much more in use in the last generation than the present, and they were very often kept what is termed running in fork—*i.e.*, taking air through not having a sufficient supply of water, consequently the weight of the column of water was very much reduced through being partly filled with air. This apparent advantage was known to the engineers by the engine coming bang on the beams directly a large lift touched in fork, which, of course, was the signal for shutting off steam, and in fact it has been said that an engineer who obtained a very high duty was rather fond of large lifts working sharp in fork, as in calculating the duty the columns were considered as solid columns of water, the fallacy of which has since been proved in sinking a shaft on the Rhine, where such a tremendous quantity of water had to be contended with that pumping it was out of the question—in fact, the whole river had to be contended with, and an iron shaft was laid down, divided into three compartments, one over the other, and communicating with each other by means of valve doors. Compressed air was forced in to fill the two lower compartments, and a column for the discharge of the water was let down. The pressure was sufficient to force nearly all the water back into the ground, and the remainder up through this column, which discharged at the surface. The men worked in this pressure discharging the debris through the valve doors until at last the extent of power of the compressor was reached, and the progress thereby interrupted.

The question of increasing the power was being discussed when a man in the shaft accidentally struck the point of his pick through the column, it being of sheet-iron, making a hole just above the surface of the water in the bottom of the shaft, and immediately the water spouted out of the top of the column like champagne out of a bottle, and the water quickly disappeared from the bottom of the shaft, when the sinking was resumed and carried down several yards more to the hard rock with the same engine by keeping a hole open, where a water-tight joint was made and all the water dammed out. This proves clear enough that when a pump is drawing air, and the column boiling and effervescing with it, it is not near so heavy as a solid column of water, which accounts undoubtedly in a great measure for the apparent high duty attained formerly, as the improved system of pumping with plunger lifts will not admit of drawing air, and I think if we put all these facts together they will prove, too, that the published reports of the duty of this engine have conveyed a very erroneous notion of its real capabilities; and hence an undue credit to the engineers of the last and the unjust imputation to those of the present generation. By this experiment with the compressed air we learn something also that can be turned to account in other circumstances. If this pressure is admitted to a plunger column just above the top clack, which would not interfere with the proper working of the pump, it would considerably lighten the load of the engine, and may be taken advantage of where it is available and the engine happens to be overloaded; and it is, moreover, highly probable that a great economy of fuel may be derived from its application in this way. Should the advantage gained exceed the cost of procuring the compressed air, which from a calculation I have every reason to believe it will, a great relief and economy will result to the users of steam pumping machinery. The experiment can be easily tried where compressed air is in use, as follows:—If the pressure of the water in the column exceeds the pressure of air at hand, run down the column until the air pressure exceeds its pressure, then admit it (the air), and it will rush up through the column and cause the water to boil up, and probably to spout out a great height above the top of the column, start the pump, and it will be found that a deal of balance can be added, which, of course, enables the engine to do its work with less fuel.

I have already pointed out that very little advantage can be derived from a high rate of expansion in this engine, and I believe the compound engine is no better adapted to utilise this advantage, so that it would appear that any further improvement must be looked for in a new form of engine altogether, in a new form of boiler, in lightening the heavy columns, and a more perfect fixing and working of the pumps, as it is in the most efficient state known to steam users throughout the world, notwithstanding these defects. The multitubular boiler is well known to give a greater heating surface than the Cornish boiler, and now that it is an easy matter to procure pure feed water the objections hitherto raised to it—that of cleaning it—can be easily removed by using the surface condenser, in connection with which a great economy would evidently be realised. A further economy can be obtained, especially where the fire is forced, by bringing the flue back over the top of the boiler before it is joined to the chimney, which at the same time it excludes the cold air from coming in contact with the boiler would bring it in a more convenient position for heating the feed water with the waste heat escaping to the chimney, which is very often 100° Fahr. above the boiling temperature. The old system of paying the enginemen and stokers a premium for good duty should be re-established, and the pitmen should also have an encouragement for good duty. I have no doubt if these items are carefully attended to that we shall see this engine actually doing the high duty which it had the fictitious credit of doing formerly. WM. NANCE.

Stanley-street West, North Shields, March 11.

THE CORNISH PUMPING ENGINE.

SIR,—Will you kindly allow me space in your Journal for a few historical remarks concerning the much-discussed question of the Cornish engine? I do not undertake to solve the problem as to where and when the first steam pumping-engine was set up; but during the time I have been occupied in preparing several papers on Cornish industries many works have come under my notice bearing on the subject of the Cornish engine. I, too, have read all the recent works on that subject; and I think my notes will give some entirely new particulars, and may, perhaps, save some trouble to future and more able researchers than myself, and who may make the Cornish engine a special study.

Thomas Savery, a native of Devonshire, according to Tredgold (see Tredgold's Steam-Engine, vol. 2, div. B., art. "History of the Steam-Engine"), "appears to have been the first who made a direct practical application of the steam-engine to raising water." In 1698, according to Tredgold, a patent was granted to Savery (the first one granted for a steam-engine of any sort), and in 1699 several engines had been erected. A paper on "Engines for Raising Water by Help of Fire" is also given in the Philosophical Transactions for 1699. In 1702 Savery published (London, 8vo.) a little work entitled The Miners' Friend, or an Engine to raise Water by Fire Described, in which a full description of the primitive engine is given. Now, Pryce states (Mineralogia Cornubiensis, page 153) that the first engine was set up in Cornwall about 70 years before the publication of his Mineralogia, or about the year 1708. This date is, in all probability, too late, for it is scarcely likely that an important improvement which had come largely into notice in 1699 and 1702 would not have been adopted till 1708 in that part of our island which most needed it, notwithstanding, too, that the construction of an engine would take several months. The great honour of having originated and set up the first steam pumping-engine is, doubtless, due to Savery, although as yet that man of genius has received from posterity but tardy praise. Nor do I think his laurels should be shared by Newcomen (or Newcomin), a native of Dartmouth, who devoted a considerable portion of his time to the study of the steam-engine, and whose application for a patent for his own engine was demurred to by Savery. (See article on Newcomin in Nouvelle Biographie Générale, and also Biographie Universelle.) The dispute, however, was settled by Savery, Newcomen, and a person named Cawley taking out a joint patent for a steam pumping-engine in 1705. Savery's idea, by the way, seems to have been that of condensing the steam by a stream of cold water, and Newcomen's that of the atmospheric engine. According, however, to some small pamphlets on Newcomen, his own invention was not set up in full working order till 1712. (See proposal for Erection of a Monument to Newcomen, Dartmouth, 8vo., 1851; an Account of Newcomen's Residence: London, Longmans, 1869—and Notes on Newcomen's Steam-Engine: London, Longmans, 1876—each by Thos. Lidstone, jun., of Dartmouth). Possibly by examining the few existing records of the deepest mines at work in Cornwall between 1699 and 1712, the names of those at which Savery's engine was used might be discovered. Prof. Robert Hunt, F.R.S., &c., Keeper of Mining Records, informs me that it was tried at Old Wheal Vor, Cornwall. Newcomen's invention was doubtless an improvement on Savery's engine, and what was known as the Newcomen engine, with some improvements by a Mr. Beighton, an engineer, and a better proportioning of the various parts by Smeaton (see Cresy's Encyclopædia of Civil Engineering, page 581), continued in use down to the time of Watt. Newcomen, who carried on an ironmongery business at Dartmouth, appears to have been a most industrious man and an original scientific thinker. Prof. Hunt also kindly tells me that Newcomen's engine was in use in South Staffordshire and Belgium so late as about 25 years since.

In Philo. Trans. for 1734 is a paper by a Walter Churchman on "A New Engine for Raising Water;" and in Philo. Trans. for 1751 is published a paper on "An Engine for Raising Water by Means of Fire, being an improvement of Savery's construction"; but I cannot discover that any improvement was at either of those dates adapted to the engines in Cornwall. Pryce states (Mineralogia Cornubiensis, page 313) that Watt's first engine in Cornwall was erected at Chacewater in 1777; this, however, I think, should be received with some qualification, for the patent for Watt's engine was granted in 1769. In a letter dated Feb. 14, 1771, from a Dr. Small (in Cornwall) to Mr. Watt, several applications for fire (steam) engines in Cornwall are named. (See the Mechanical Inventions of James Watt, by J. P. Muirhead, M.A., London, 1854, three volumes, with introductory memoir, vol. 2, page 15.) Another letter (in vol. 2 same work) dated April 24, 1775, from Boulton to Watt, also states several engines are wanted in Cornwall. In a letter from Watt to Dr. Black, dated Redruth Dec. 12, 1778 (see page 13, vol. 2), "the large engine at Chacewater, lately finished," is spoken of. Watt also in this letter speaks of five other engines that had been erected in Cornwall, and of eight others that were in contemplation; and from the letters I cannot glean that the Chacewater engine was the first, but the largest, of the early Boulton and Watt engines erected in Cornwall. Watt, in the letter just quoted, describes the engine at Chacewater as being "63 in. in diameter, with a 9 ft. stroke, and going out of hand under its full load 11 strokes per minute," and working "a pump of 17 in. diameter and 53 fathoms deep; and, moreover, "putting in motion a very strong connection rod, 25 fms. long, before it comes to the pump head," &c. It may also be mentioned that, according to Muirhead (vol. 2, page 370), Watt in 1783 invented an engine for winding ores out of the Cornish mines. To trace the facts connected with the improvements of Murdoch, Woolf, Hornblower, and Trevithick would be mere repetition. The gentleman to whom we are indebted for the latest and crowning improvement of the Cornish engine, and by which that piece of mechanism is rendered as complete as human ingenuity can, perhaps, make it, is one still living amongst us. I refer to Mr. William Husband, C.E., &c., of Hayle, the adapter of the safety apparatus for catching the engine in case of breakage in the shaft, and so widely known in Cornwall and elsewhere for the prominent and useful part taken by him in engineering work generally. The writer desires to take this opportunity of expressing his best thanks to Mr. Husband for the latter's kindness in favouring him with particulars concerning the safety apparatus some time since.

Those wishing for detailed descriptions of, and further particulars relating to, the Cornish engine may consult De la Beche's Report on Geology of Cornwall and Devon (London, Longmans); Philo. Trans., vol. 120, page 121, paper on Improvements in Steam-Engines in Cornwall, &c., by Davies Gilbert, President Royal Society; Henwood's address before the Royal Cornwall Institute for 1871; the Transactions of the Society of Civil Engineers; Weale's Series; Wicksteed's works on the Cornish Engine; also, Pole on the Cornish Engine; and the various notices that have appeared in the Engineer and *Mining Journal* from time to time. JAMES QUICK.

Leadenhall-street, London.

BLASTING BY MEANS OF COMPRESSED AIR.

SIR,—By request of Mr. W. E. Garforth we beg to send you the following verbatim copy of the commencement of the paper which he read before the Manchester Geological Society, and which he placed in our hands at the meeting, for publication in the Transactions.

JOSEPH S. MARTIN,
W. G. GRIMSHAW, } Hon. Secretaries.

Manchester Geological Society, March 12.

"Mr. President, and Gentlemen,—In endeavouring to dispense with the use of gunpowder and other explosives in mines, some chemical compounds and a great number of mechanical appliances have been tried with more or less success. In many cases letters patent have been taken out for breaking down the coal by hydraulic apparatus and by wedges of peculiar construction. The first patent taken out to use highly compressed air was by Mr. Macnab, of South Wales, and this was followed, some time after, by Mr. Marsh's patent. These gentlemen, therefore, may be said to be the originators of the compressed air cartridge principle," &c.

BLASTING BY COMPRESSED AIR.

SIR,—Will you permit me to make the following remarks in reply to Mr. Marsh's letter in last week's Journal? I think he should have obtained a correct report of my paper before making his unjust and uncalled-for charges which I distinctly repudiate, and say that at the time he made them he knew them to be unfounded. I never saw his patent specification until March 1. My paper was read on February 25, at the request of several members of the Manchester Geological Society (of which I am a member), who desired to know the results of the experiments which Mr. Ernst Reuss (the sole licensee) and myself, had been making to break down the coal by means of compressed air on the principle of Mr. Marsh's invention. When the Transactions of the Society are published it will be seen that I have given a true account of all that has been done up to the present time in this matter. Although Mr. Marsh has never been down the pit during any of the experiments, yet it would now appear that he wishes to claim not only the invention for which I have given him credit, but also improvements effected by others, and based entirely upon results obtained after repeated trials in the mine. I venture to affirm that Mr. Marsh is unable even now to describe the means by which his invention, which when he last saw me had been pronounced a failure by the principal colliery proprietors and mining engineers of Wigan, has now been rendered a success as regards breaking down the coal. Had Mr. Marsh written for a copy of my paper, no doubt he could easily have obtained it, and there would have been no necessity for this correspondence.

Highfield House, Dukinfield, March 12. W. E. GARFORTH.

COLLIERY ACCIDENTS, AND INSURANCE.

SIR,—As the dreadful calamities at the Stanley Main and Victoria Collieries during last week will draw attention once more to the question of insurance of provision for the sufferers by colliery accidents, I beg you will afford me space to relate a few facts respecting the best known mode of providing relief for widows and children of miners whose lives are sacrificed in such large numbers in and about our coal mines, and for the miners themselves, many of whom are maimed, and often for life.

The system I refer to is that now adopted in six different coal districts in England and Wales, and worked out by means of friendly societies called Miners' Permanent Relief Funds. It is briefly this—the miners themselves are induced to contribute 3d. weekly from their earnings. The owners of collieries give 20 per cent. upon that which their workmen contribute. Surplus funds subscribed by the public on the occasion of colliery disasters in years gone by are added, and such as are charitably disposed give donations and subscriptions, and the result is that a really good and permanent relief is afforded to the sufferers, not only when there are many lives lost together, but in cases of single accidents, which do not evoke public sympathy, and in those cases of injuries to the miner which do not prove fatal, but disable him from being able to support himself and family. Thus on the principles of self-help and co-operation, aided by the voluntary support of the public, the whole thing is done without any appeal to the country, and without making paupers of the recipients, or causing them to be dependent upon other people's charity.

There was no public subscription raised for the relatives of those who perished at the late explosion at Pemberton, near Wigan, as was the case at the three succeeding great disasters—Blantyre, Abercarne, and Dinas. And why? There was no need for it. The unfortunate men were members of the Lancashire and Cheshire Miners' Permanent Relief Society, and from its funds came, and still comes, that which supports those who were dependent upon them. These societies are registered as friendly societies according to Act of Parliament. Their funds are thus secured from being used for trade purposes or being squandered in speculation, and the public can place confidence in them. They are practically managed by the workmen themselves by means of local agencies at the various collieries or firms, with a central committee composed of a majority of ordinary members and a small number of honorary members. In this way the West Riding of Yorkshire Miners' Permanent Relief Fund Friendly Society—which it is intended shall embrace the whole of the county—is managed; and by its agency, since its commencement with 1500 members, in March, 1877, funds amounting to over 8600*l.* have been got together. Relief had been distributed, up to December 31 last, to no less than 1235 members, besides legacies in eleven cases of fatal accident, with weekly allowances to widows and children, in all 1640*l.*, and after paying for management, &c., the society is worth over 6000*l.* Its members number between 5000 and 6000. As yet the system has not been accepted so generally in the West Yorkshire district as in the South, but its promoters are desirous that it should do so; and as it is important that all for whose benefit it is established should know that they may avail themselves of its help, I ask the favour of being allowed to give the scale of contributions and benefits. They are as follows:—

Any person employed in or about a coal mine is entitled to membership by a payment of 3d. per week (benefits commencing from date of entrance). Boys under 16 years of age are considered half-members, and pay 1½d. a week. The benefits are—To the parents

of a boy who gets killed 12*l*. If above 16 and unmarried, 23*l*. The widow of a married member 5*l*., with 5s. a week for life, or until remarriage, and 2s. a week for every child under the age of 13, till that age is attained whether the mother marries again or not. An extra 1s. 6d. per child when left without mother. In cases not fatal 6s. a week is paid for 26 weeks, when, if the disablement continues, 8s. a week is allowed permanently. Besides these benefits a superannuation is provided amounting to 6s. in case of old age.

Without entering further into details, I wish to appeal to your readers, and ask those of them who are miners to become members of this excellent institution, and to assist in increasing its usefulness by inducing their fellows to join. Those who are officially or otherwise connected with collieries, or in any way interested in the miners' welfare, might greatly assist them to help themselves by interesting themselves in this good cause, and bringing it before their notice.

I shall be glad to forward copies of rules and every information to any person writing to me, or I will visit any colliery or other place and explain fully the workings of the society.

29, *Westgate, Barnsley, March* 10. WM. WATSON.

THE HULTAFALL MINES.

SIR,—Remembering how these mines were introduced to the public, some 18 months since, the present low quotations must be a great discouragement to shareholders. But where all this time are Messrs. Tredinnick and Dormer, who so industriously belauded the enterprise? How is it that the latter, whose indignation was so great at the supineness of investors, and the wretched depression of mining matters, has suffered the shares to go begging at par price? How is it that he has no word of good cheer now that they have sunk to a third of that price? In sober seriousness, however, from the nature of the many statements I have heard, the property does seem to be an extraordinary rich one, and though one cannot but believe there has been some mismanagement, and perhaps extravagance, in the earlier conduct of our affairs, it is to be hoped that a lesson will have been learnt from past mistakes, and that a sound and prosperous state of things will ere long result from the present (I hope) more energetic and more economical management and direction. If, however, shareholders desire this, and to see a speedily enhanced quotation, they must at once put their shoulders to the wheel, and exert themselves to furnish the necessary funds. It must be very mortifying to them to see others getting in at a third of the price they paid, and this after waiting so long, but the preventive remedy is in their own hands. Let them find the money, but a small sum, that is needed, and we shall speedily see a rise in Hultafalls. AN OLD SHAREHOLDER.

P.S.—Shareholders must consider that in failing to make this effort to provide the necessary funds for working the mine they are not only deferring the realisation of the success they desire, but also run a very great risk of losing their property altogether, and sacrificing the money they have already laid out.

"OLD TELEGRAPH" (BINGHAM) MINES, UTAH, ON THE PARIS BOURSE—A RECTIFICATION BY COL. BERTON.

SIR,—Permit me to rectify an error which has been circulated by some French papers, and repeated inadvertently by the *Mining Journal* of March 1—that I had left the United States since the year 1875, and that I was not, therefore, in a position to express any opinion in regard to the Old Telegraph Mine of Utah. This is entirely untrue. Since the year 1875, on the contrary, I have spent most of the time in the Pacific States, where I was instructed by both M. Leon Say, Minister of Finance, and M. Ruau, Director of the French Mint, to examine and report upon the leading gold and silver mines, in order to ascertain their eventual and probable production, and also to enlighten the French Government upon the silver and the monetary question in the United States. The several reports which I made were forwarded by me from San Francisco to the Director of the French Mint, and published in full by the *Mining Journal* of June 10 and Aug. 5, 1876; and also by the Paris Journal des Débats of Aug. 28 of the same year.

Furthermore, I can state that since my return from the States at the end of 1877, I have been twice to California and back, returning to Paris on Nov. 7 last. The error being now rectified, I beg to state that I retract nothing of what I have stated to the Minister of Finance concerning the Utah Mines sold in the last eight years in Europe, and their lamentable failure on the English market.

Paris, March 12. JULES BERTON,
Ex Vice-Consul of France in California, and President of the "London and Pacific Coast Mining Bureau."

GOLD MINING—NEW SOUTH WALES.

SIR,—There has lately been a marked revival of interest in gold mining amongst our practical miners, and more than one promising reef has been opened out in various localities where gold was never dreamt of before; but noticeably for its large extent, and the rich yields from two or three of the principal claims, is the Barrington gold field, of which at present Back Creek is the centre of operations, but fresh discoveries are being made every week, and the reefs are now traced for miles upon miles in different directions, and, as far as any judgment can be formed, where with but few exceptions only mere surfacing has been done, the whole districts promises to be one of the largest and richest yet found here.

In one claim, which has two shafts sunk, and is only down about 140 ft., the average yield of over 200 tons of stone was 14 ozs. per ton, and crushings from other lines of reef have gone from 1 oz. up to 3 ozs.—both handsomely payable returns; and according to the extract from the Sydney Morning Herald (a reliable paper) sent herewith, discoveries in a different part of the district are likely to be equally valuable, especially if the 4 ft. reef, there mentioned as giving 4 ozs. per ton, proves to be a permanent one with depth, as such a yield from such a body of stone would mean a real El Dorado to the lucky finders. Bega, mentioned in the other paragraph, is quite in the other direction from Sydney (south), and is a comparative old agricultural settlement. In the same line of country also is Yalwal, where a reef has been known of for the last 20 years as outcropping up and down the side of a steep hill, showing gold when broken, and yet so sleepy is New South Wales that is is only just going to be worked. The Araluen alluvial claims are also reviving again, and the indefatigable Newman is now likely to reap the reward of his new system of drainage, which has revolutionised the former style of working there. The Adelong quartz reefs are also proving themselves rich in depth, which is the best proof of a permanent steady mine, and are now fully carrying out what I suggested (two years backs) was almost sure to be the result of ordinary energy there, when patience and moderate capital were brought to bear. Real gold mining is only just beginning in New South Wales, and I feel satisfied the results will speak favourably for themselves before another year or two is over. R. D. ADAMS.

Sydney, N.S.W., January.

From Bega it is reported that an important discovery has been made at Nelson. A lump of quartz was found by a selector named Taylor in his paddock. The specimen weighs 38 ozs., and is thickly studded with gold. It is supposed to contain fully 6 o.z. of pure gold. The locality is about four miles from the reef which the Government have agreed to aid in developing. Several parties are out on the Nelson ranges getting more than tucker.

From Barrington (Back Creek) gold field our correspondent writes:—"On New Year's Day a reef was discovered by Johnson and party about three miles west from here, and named the New Year's Gift. The rubble gives fine prospects, but the reef is so far narrow, still many leases have been taken up, and shares are already changing hands. On Friday Mr. J. G. Jackson came in from Cobark, and reported a discovery of a reef three miles from Hook's Cobark station, at the head of the creek of the same name; by prospects the stone anticipated to realise 5 ozs. to the ton. The lode appears 4 feet wide, and crops out for nearly 1000 feet. The discoverer certainly is a very old and well-known miner, and ought to deserve credence, especially when he supports his statement by investing his money in leases and costs of working, besides loss of time and the hardships incidental upon mining. Besides these other minor finds are daily reported, and each discoverer, as a matter of consequence, is sanguine of success. The working of the mines is here and there resumed again. In the Mountain Maid the number of men engaged by Mr. Reynolds, the manager, is eighteen, and fine stone is raised. The machines already on the field seem out of repair or not finished, hence not at work, though plenty of stone waits the operation. The last crushing at Burley's machine was from the Hidden Treasure, but the owners of quartz had to stop after a few tons had been operated upon, consequent on the most urgent repairs to fittings of and the machinery itself. The stone operated upon (the small heap of 38 tons) realised 1 oz. to the ton, and the 16 tons from the large heap 4 ozs. to the ton. The party of miners in resuming work came at the 70-ft. level upon a fine well-defined reef, of over 2 ft. wide, showing rich gold, the walls continuing still 4 ft. apart. I have also seen very rich stone at the Rose and Thistle. At the Bowman claimholders have fully set in to work wherever they think the show is good. Upon the Cobark the several reefs warrant the expectation that a township springing up there, which by the favourable physical and geographical position will prove a very important acquisition to this district and to the colony at large, being more accessible to ordinary traffic, and offering all facilities to settlement, the soil being adapted to reward cultivators. In mining besides the above information as to the new finds, Messrs. Martin, Thomas, and party drove a tunnel of 27 ft. At 10 ft. they reached the vein, and, therefore, 17 ft. along the line of reef. They have also two shafts, respectively 6 ft. and 16 ft. deep. As already stated the reef crops out for 200 ft. from 6 in. to 12 in. wide. The stone by several tests has proved more than payable, and shows a deal of mundic and some galena. They are already five leases taken up, and shares are freely changing hands. The banks have established branches—the Australian Joint Stock Bank and the Commercial Bank. We have also a Mining Registrar and Warden's Clerk combined, and the duties are performed by Constable Sullivan.

WELSH GRANITE QUARRIES.

SIR,—As my name is more than once referred to, and evidently for a purpose, in a letter signed "Would-be Investor of £4000," which appears in the Journal of Saturday last, with reference to the above important branch of British industry, will you kindly afford me space in the next issue of your largely circulated paper to say a few words in reply thereto?

It is about four years ago, I think, that my attention was first drawn to this famous sett stone quarry district, and I must admit that "Would-be Investor of £4000" is quite correct in assuming that what I then saw, unlike the effect it had on him, created a marvellous impression upon my enthusiastic nature, and what will be still more marvellous and strange, I hope in the mind of your correspondent, "Would be Investor" (for I can hardly believe, if he really possesses 4000*l*., and is disposed to invest it in Wales, he would not deliberately state that which he knew to be inaccurate is the fact that, although I have made at least 100 visits and paid over 150*l*. for car-hire to the "Would-be Investor's" iron bound sett stone quarry district I am more than ever convinced that no channel for the investment of 15,000*l*. or 200,000*l*., with anything like a similarly safe security, not only for a fair interest of (say) 10 or 15 per cent.; but where every prospect will, in my opinion, be found to exist for realising over 50 per cent. per annum in any other part of the United Kingdom. I do not mean by the formation of public companies, in which I am unbeliever, but by private syndicates or individual capitalists and enterprise. I have arrived at this conclusion respecting this great quarry district from the following reasons, which I believe will be found strictly correct.

1.—That as the stone quarried from this district, especially that from the two quarries belonging to the Welsh Granite Company, one of which I consider the finest and best managed quarry extant, and also that of Port Nant, belonging to Messrs. Kneeshaw, Lupton, and Co. The North Wales Granite Quarry and others in the district will, in my opinion, be found to resist wear and tear with less slipperiness than any other stone yet in use and quarried outside this district, and that the demand will continue to increase to an extent (now that all municipalities seem to avoid the use of the more slippery kinds of paving) far exceeding the possibility of one-tenth of it being met from this district.

2.—That in my opinion no other district in the kingdom can ever hope to compete in price with this, as I believe, sett-men from Scotland, England, or elsewhere, owing to the uniform structure of the rock and the ease with which it cleaves into all desirable shapes and sizes, will be able and do at present realise a higher rate of wage in this district, although the contract price for sett making is I understand lower than in quarries outside the district; consequently, it is only a matter of affording accommodations for fresh arrivals ftom other quarry districts, and the output from every quarry in this district could be increased I am convinced to the utmost extent of its working capacity in due time.

3.—That as most of the quarries in this district are so situated as to admit of their produce being taken alongside ship by gravitation traction, and others, like Port Nant, West Nant, and Ty Mawr, are situated close to the shore, whereby long and expensive inclines and tramways are dispensed with, the superior advantages of this district must be obvious to all who know the district; and that, as the stone is believed to be the most favourite in the market, especially that of the Welsh Granite Company and Port Nant, nothing, in my opinion, but the total disuse of granite for street-paving purposes can prevent this district from monopolising, as it were, the granite trade in most of our great centres of consumption to the extent of the production of this extraordinarily advantageous quarrry district, as with all the foregoing facilities in conjunction with the well-known shipping conveniences the iron-bound coast (which the "Would-be Investor of £4000" refers to as most dangerous) affords for exceedingly cheap freights to nearly all the great seaports of England, and many of the Continent. I should like to know where a safer field for investment, considering the enormous increase in the consumption of granite from year to year in London, and I presume the increase in the provincial towns will be of a corresponding ratio, can be found.

With regard to competition in the trade I differ entirely with the opinion of "Would-be Investor." Where, I ask, have the greatest business fortunes been realised in England? Why in the localities where the greatest number of businesses of a similar kind are carried on; for instance, St. Paul's Churchyard and Regent-street for ladies' drapery—and if you take any other business in London or any other important town in the kingdom you will find that where the greatest competition exists the greatest success follows; and I am quite convinced if this principle would advantageously work anywhere it would certainly do so in the Carnarvon Bay Quarry district, as there is an almost unlimited use for this peculiarly valuable paving and macadamising material.

Of course, I do not anticipate, at any rate during the next 20 years, that any quarry, excepting perhaps Port Nant, will reach even the present gigantic scale of operations of the Welsh Granite Company's Eifl Quarry, so successfully conducted by Mr. Farren.

When I first became interested in this district I was led to believe from engineers' reports that I received, together with what I had incidentally heard and had been told, that the Welsh Granite Company's profits could not be much less than 30,000*l*. a year, taking the output at 70,000 tons per annum, and the profit from 7s. to 8s. 6d. per ton. I am afraid, however, that this cannot be relied upon, nor anything like it, if their manager's statement is to be taken as fully correct. I was also under the impression, judging from the extent of what was pointed out to me as their freehold village, consisting of upwards of 100 houses, with all their plant, buildings, machinery, and other valuables, including their shipping pier, that the paid-up capital could not be less than at least 100,000*l*.; but, to my utter astonishment, one of my Southport friends told me, on Thursday last, that he had just ascertained that it did not even approach one-half of this amount; in fact, so far as I can now remember, he spoke of their consolidated stock being 24,300*l*. If this represents the capital of the company—for which, however, I cannot at present vouch—"Would-be Investor" will probably be as much surprised as I was favourably impressed with what I saw during my first visit to this famous district of Tom Tiddler's ground.

Of course, your readers will be able to see through the drift of "Would-be Investor's" letter, and judge of the source from which it probably emanated; but I must say, with all due respect to the manager of the Welsh Granite Company's Quarries, and I believe a shareholder to the extent of many hundreds of pounds, that his remarks to so-called "Would-be Investor" were anything but generous. Regarding the other quarries along the "iron-bound" and dangerous coast, I have received the following letter from Mr. John Meredith. Will you kindly insert it along with this, as it goes far towards replying to "Would-be Investor's" letter?

If a man were about to open a grocer's shop next door to a large and profitable establishment would it be wise to consult the owner of the existing establishment? EDMUND SPARGO.

Bangor, March 12.

DEAR SIR,—In reply to your letter of yesterday's date, I beg to say that I have read the article in the *Mining Journal* of Saturday last of a so-called "Would-be Investor" not with surprise, as I could not expect anything else from the quarter from which I think it emanates.

Allow me to assure you from an experience of 18 years in the granite trade of Carnarvon Bay, previous to which from 20 years of age I was more or less interested in the stone trade in various places, consequently I really ought to be in a position to speak with some authority on this matter, seeing that the whole of my life has been devoted to this particular business, and that the statements in the Journal are inaccurate.

"Would-be Investor" says that the coast all the way from Carnarvon Bay to Porth Dynllaen is an iron-bound coast. Perhaps he refers to the iron mine formerly worked by Mr. Benthall, which is almost adjoining the Welsh Granite Company's loading jetty.

During the 16 years I was at the quarries adjoining the Welsh Granite Company I do not remember experiencing the difficulties referred to by "Would be Investor." The greatest difficulty I found was to obtain setts in sufficient quantity to meet the increased demand. As to shipping them we never apprehended any difficulty. You will see the inaccuracy of the statements of "Would-be Investor" from the flats, Llanfair 105 tons, and the Parker 120 tons, were loaded at the Cambrian Granite Company's jetty on Friday and Saturday last. At the beginning of this month I saw three vessels at Port Nant jetty being loaded.

The loading facilities of this quarry are so complete that they are able to load nearly 100 tons per hour. The "Would-be Investor," of course, would not have noticed the superior loading facilities of Port Nant over the Welsh Granite Company, as his visit appears to have been made for another purpose. Vessels may be seen loading throughout the year on the "Investor's" iron-bound coast, whenever there are freights for them. "Would-be Investor's" statements are so partial on all points that you will, of course, see the drift thereof.

Perhaps he will, however, allow me to satisfy him regarding what ought to be the cost of putting setts f.o.b. at any well-situated quarry in the Carnarvon Bay district. My experience of the cost has been as follows; but, according to "Would-be Investor's" account they should be produced for less at the Welsh Granite Company's Quarry:—

	£	s.	d.
4 miners, at 4s. 6d. per day		18	0
Powder, steel, and fuse, at 4d. per ton		13	4
4 labourers, at 3s. per day		12	0
2 smiths, at 5s. per day		10	0
1 carpenter, at 4s. 6d. per day		4	6
1 sett inspector, at 3s. 4d. per day		3	4
Wear, per ton, at 1d. per day		3	4
Commissions, 30s.	1	10	0
Coal on setts, at 2s. per ton		6	8
Stationery, rates, bills of lading, at 1d.		3	4
Royalty and way leave, at 3s. 2d. per ton		11	8
Quarry manager, per day		9	0
Sett makers, 40 tons, at 10s.	20	0	0
Making a total of	£26	5	2

The same prices as the foregoing will answer the West Nant Quarry, but the West Nant being equal to Guernsey granite for macadam the profits will be increased thereby.

It will be seen, Sir, that from the above estimate of Mr. Meredith of the cost of 40 tons of setts a day, and assuming the average price to be 20s. per ton f.o.b., a profit of about 7s. per ton, or 35 per cent. on the turn over would be realised: and, of course, it is only natural to infer that the larger the output the less would be the working expenses in proportion.

The average price of three different sized paving setts f.o.b. in this district was estimated some time ago by a late deputy surveyor of one of the principal cities in Scotland at 22s. per ton.

Mr. Meredith in reporting upon a quarry in which I am interested in this district states:—"The following are the sizes of setts most commonly made, and the price paid to sett men for their manufacture after the stone has been detached from the main rock

Depth—inches.	Breadth—inches.	Length—inches.	Price to sett men. Per ton.
4	4	4	11s.
6	3 to 3½	4 to 7	9s. 6d.
5	4 to 4½	5 to 10	9s.
6	4 to 4½	6 to 10	8s.
6	4 to 4½	4 to 4¼	10s. 6d.
7	3 to 3½	5	11s.
7	4 to 4½	any length	8s. 6d.
8	3½ to 4	6 to 10	8s.
6	3	6	9s.

These prices show an average of about 9s. 4d. per ton; to which add in order to cover other inclusive costs—such as quarrying the stone, keeping quarry free from debris, cost of transit to vessel and putting f.o.b., royalty, and way leave, 3½d. per ton; incidentals, management (local), wear and tear, and general depreciation of plant, 4s. per ton on an output of 100 tons per day, bringing the inclusive average cost on board ship alongside your jetty to 13s. 4d. per ton. I have made this estimate from the costs incurred in the production of setts from the 16 years experience I have had in sett quarries."

The above estimate is further confirmed from what I learn this afternoon from Mr. Humphreys, of the Royal Hotel, Carnarvon—that during last year his quarry, "Pystill," the one referred to in "Would be Investor's" letter, was actually taken by sett men on a contract to produce the setts ready for shipment at an inclusive cost, with the exception of royalty, at 14s. per ton. These facts speak for themselves. He discontinued this system of working, he told me, much against the desire of the men.—*Near Pwllheli, March* 11. E. S.

WELSH GRANITE COMPANY.

SIR,—My attention has been drawn to a very amusing correspondence which has lately appeared in the Journal. In this correspondence the name and operations of this company have been very freely handled, and I venture to think most unwarrantably so. What can it matter to your readers whether we employ 2 men or 2000? Whether we produce 6 tons a year or 600,000, even if such information (incorrect though it be) be given with the utmost seriousness and apparent exactness? I should have passed these letters in silence, but it has been pointed out that by so doing your readers and the public would be free to assume that these letters were written with our knowledge, if not with our sanction and approval. As I do not choose that the name of this company shall be used unauthorised to induce people to go into speculations in which they may or may not lose all they invest, I beg the hospitality of your columns to state that the estimates of the profits we are said to be making, our output, &c., which have appeared not only in the Journal, but in certain prospectuses now before me, are mere ludicrous guesses, and grossly in excess of the truth. Content with this protest, I beg to say that I shall notice no further communication which may appear, and that no statement respecting this company is authentic unless signed by— GEORGE FARREN.

Trefenai, Carnarvon, March 10.

IRISH QUARRIES.

SIR,—The correspondence in the Journal on the subject of Welsh granite quarries has induced me to offer a remark on a high range of rocks I have often seen in this county which consist of a substance harder than any granite I have ever seen, and for covering streets or roads I think it would be the most durable stone ever used. I may not be able to give it its proper geological name, but will call it ironstone. It rings like metal, and an unlimited quantity may be quarried at a cheap rate. Vessels can load in perfect safety in any wind or weather half a mile from the quarries, and barges can load at the works; there is also an excellent road from the quarry to the quay. A would-be investor of 4000*l*. need not invest so large a sum in order to realise a handsome profit provided there is a large demand for the article. WILLIAM THOMAS.

Cappagh Mine, Ballydehob, County Cork, March 10.

BWLCH UNITED MINES.

SIR,—Knowing you are at all times not only willing but anxious to further the interest of legitimate mining, I beg to forward you a few remarks respecting this property, which is situated on the Goginan lode, and immediately to the east and adjoining the Goginan Mine. The present depth attained at these mines is about 100 fms. from surface; but little ground has been opened under the 70 from surface, and above this level about 250,000*l*. worth of rich silver-lead ore has been raised from three veins—the main, or Goginan, the Pwllrheinydd, and the north lodes. The lode over the Goginan deep adit, which is driven into the boundary of the Bwlch United Mines, and will pass under the deepest part of these mines 30 fms., has yielded in that grant about 500,000*l*. worth of silver-lead, and was extremely rich from the adit down to 50 fms. deep, so that there cannot be a doubt upon the mind of anyone practically acquainted with mining in this county that from the 70, at Bwlch United, where good courses of rich silver-lead ore are being laid open, as well as in the 60 down to the depth of 50 fms. under the Goginan adit, or for 110 fms. deep under the 60, which would be 70 fms. over Goginan adit, and 50 fms. under adit, that there must be many hundreds of thousands of pounds worth of profitable ore ground to be taken away, the principal portion of which will be over adit, as the Bwlch United by continuing the Goginan adit will be an adit level mine down to the depth of 130 fms. from surface. Every effort is being made to get down to the 130, or adit level, and there are nine men kept constantly sinking the engine-shaft for this most desirable purpose.

The three lodes to which I have referred have never been worked together, or at one time; but the Goginan lode itself produced as much as 130 tons of lead ore per month, the Pwllrhinydd 50 tons per month, and the north lode 50 tons per month; but when once the adit level is an accomplished fact these three lodes can be worked simultaneously together, and a return of from 200 to 250 tons of silver-lead ore per month could be more easily made. With

their very extensive machinery, which comprise a 50-ft. wheel 5 ft. breast, a 45-ft. wheel 4 ft. breast, a 30-ft. wheel 3 ft. 6 in. breast, a 25-ft. wheel 2 ft. 6 in. breast, and several small wheels for dressing the ore, either 130 or 150 tons could be managed from the lodes separately. As a great deal of nonsense, in my opinion, has lately been written about the mines of this county, I thought it would not be amiss to lay these matters of fact before the mining public, being only interested as a shareholder, and believing if they were made acquainted with them that not a few parties would feel inclined to purchase shares at par, the mine being divided into 20,000 shares of 1*l.* each, representing a capital of 20,000*l.* for the entirety of the property; and, should this prove to be the case, any further information that might be required would be readily given by

Aberystwith, March 12. ABSALOM FRANCIS.

MINES AND MINING IN CARDIGANSHIRE.

SIR,—In last week's Journal your correspondent for Salop and Cardigan, &c., states that he holds an interest in Cardiganshire mines, and that if he did not he would be very sorry to traduce them. Of course, as he writes anonymously I can only take it for granted that he, as well as "J. G.," really hold an interest in some mine or mines in the county. Will you allow me to ask what is the meaning of traducing mines if statements such as the following is not meant to traduce the mines of this county? "But I protest I hope to continue to protest against the mine gambling which is so common in the neighbourhood whence "Miner" hails, and which leads one to the conclusion that more mines are started for the sake of financing than for ordinary mining." Now, as "Miner" hails from Goginan I will, with your permission, give you a list of the mines surrounding this place, and leave it for your correspondent to point out which of them may be treated in the light of a gambling mine. I will begin westward with West Goginan, then Melindwr, both under the management of Capt. J. Kitto; then the Goginan Mine, managed by Messrs. Taylor and Sons; the Bwlch United, under the management of Capt. Bray; Caenant, under the management of Capt. Phillips; the Cwm Brwyno, under the management of Capt. Morgan Morgan, and as your correspondent has mentioned my name in conjunction with this it will be only right here to explain that I have nothing whatever to do with the management of this mine, and am only interested as any other ordinary shareholder in the welfare of the mine. I may say, however, that rich courses of ore have been met with in the bottom of the 92 fm. level and in driving the 80 east, and that if a cross-cut be driven 5 fms. to the north in the 92 fm. level, 50 fms. west of the engine-shaft, it would intersect a course of ore worked over the 80 fm. level up to surface for 100 fms. long, and would, if as productive as in the upper levels, lay open 36,000*l.* worth of profitable ore ground, and would give ample time and opportunity to fully develope the mine, which should make very large returns at a smaller cost from its advantageous position than almost any other mine in this county. Tyn-y-Fron comes next, where machinery for dressing is only wanting to make it a profitable mine, and surrounding there are New Bronfloyd, Old Darren, South Darren, East Darren, Powell United, Aberystwith Mines, and the Temple. I think all the gambling is simply and purely the invention and the imagination of your correspondent, who seems to swallow every little gossip he hears, as I before said, as gospel.

The South Cambrian Mine is opening out all that can be desired, and the forebreast, which is gaining backs or heights rapidly, is now much richer than any portion laid open. The Cambrian Mines are also developing the richest courses of copper and lead discovered in Cardiganshire for many a year, but it will require some time to lay them open to work them to the best advantage, and if the shareholders during this time are led to part with their interest in the meantime from any untrue and absurd remarks from the above said correspondent they will have themselves only to blame.

Goginan, Aberystwith, March 11. ABSALOM FRANCIS.

IS IT RIGHT TO PAY PURCHASE MONEY FOR MINES?

SIR,—I am glad to find that some of your correspondents are taking up this question, and I would like much to see it thoroughly discussed. As matters at present stand no sooner is a mine discovered than a company is got up to (1) purchase the mine, and (2) to work it. From a seller's point of view two things would make him anxious to sell—1. That the mine is capable of more extension than he has capital for, and hence he wishes to make a little more money off it than he would do if working it on a small scale. Or, 2. That he has doubts of the mine being a good one, and gets up a company to share the risk. A third may be noticed where a speculator sells what there really is not, and what there is not, in his opinion, the slightest chance of it containing, and so he sells and makes himself a knave. There are in general the three classes, but there may occasionally be a fourth, where, for reasons apart from those, parties may be anxious to realise.

It seems to me that, generally, the seller belongs to the other three classes, and he sells to a second man, who sells to a third man or company at a great advance, and this premium hangs like a load round the necks of the partners. For example, on what ground can the Leadhill Mines have failed to be less worth 120,000*l.* than they were when they were bought by the present company five or six years ago? These shares are now selling at 30s.—that is to say, the mines are now said to be worth 30,000*l.* instead of 120,000*l.*, and probably are worth no more. But one would like to ask why? Certainly not that there has been any outlay on the mine and that it has been lost, for anyone who saw them ten years ago would fail to see any alteration. On the other hand, one fails to see what there ever was for 120,000*l.*; and it would be well to know what, if any, was the purchase money paid for this mine.

Again, 60,000*l.* was paid for Hultafall Mine, which according to your "list" is now worth 24,000*l.* What purchase money was given here? I have a recollection of famous reports, and one by Mr. Currie Gregory on this mine, but still this is the story.

AN ENQUIRER.

IS IT RIGHT TO PAY ANY PURCHASE-MONEY FOR MINES?

SIR,—It is a convenient, though not very novel, method of evading an awkward question for a writer to declare that he is awaiting the revelation of the questioner's name; but that it is an evasion is so transparent that no one is deceived by the subterfuge. An American editor, referring to a certain class of writers whose illegible writing wastes his time and temper, and deprives his compositors of the power to earn fair wages, ironically remarks that a fine handwriting is often regarded as evidence of State school training, and scribbling as a sign of genius, facetiously adding—"and frequently the only sign of genius that can be discovered." In the same way it may be said that to sign one's name and address to a published letter is a merit—"and frequently the only merit which the letter possesses." No anonymous communication ever appears in a newspaper, since the writer's name is always known to the Editor, although such writer may prefer the public to determine the value of his letter upon its merits rather than from the name of the author. For a professional man to give his name and address would appear far too "fishy" to suit "Actuary," as it might create the idea that he wished to advertise himself gratuitously. With these few observations I will leave your correspondent to reply to my previous letter, or by his silence convince your readers that he is unable to reply to it without exploding the fallacy of the views he has propagated.

Now as to Mr. Salmon's letter of March 6, in which, as most of your readers will admit, he completely stultifies himself. His friend the ironmaster took over the property precisely upon the terms which I have declared to be the only terms reasonable. The previous holders could do nothing with it, and, therefore, it was worthless to them. Consequently the ironmaster paid no money for this (at the time) worthless property, but merely undertook to pay to the proprietor the same royalty as the former holders had paid him. Mr. Salmon does not say that the ironmaster has realised any profit, and infers the reverse, and also shows that such ironmaster derived no profit worth paying for from the former holder's labour. It is problematical whether the 1,000,000 tons can ever be wrought to a profit, and at the present moment no one could touch the property and fulfil the conditions of the lease without incurring certain loss; and, as a matter of fact, it would at present be impracticable to sell the lessee's rights at any price whatever, so that if the ironmaster could obtain the appraised value of the machinery and plant on the property he would be fortunate. But let Mr. Salmon place the ironmaster in the position of a purchaser who had paid the previous holders a given amount—say, 10,000*l.* purchase-money for the royalty which he took over for nothing—and he will see that the ironmaster would have been deprived of 10,000*l.* of working capital, and probably could never have bared a square yard of the hematite. Mr. Salmon regards the matter from a seller's point of view, I from the point of view which all will admit to be necessary to secure successful industrial progress. ACTUARY.

March 13.

IMPROVING PROSPECTS OF MINING—CAUTION.

SIR,—It must be with pleasure that investors in mines see the turning point in the long lane, which has at last become a fact. Tin, lead, and iron have had a rise, and we may with confidence look for a yet larger advance in the price of the two former metals, and a corresponding advance in the value of our mines; in fact, the improvement has already set in, and without doubt will continue. It, therefore, behoves us *bona fide* investors in mines, not mere speculators, to consider how we are to make the most of the good time coming. With this object it will be well to look back (say) for the last ten years, and with the aid of your articles, reports, and market lists to make out the mines that tend to enrich the owners, at the same time to improve the entire morale of mining enterprise; also to examine our own investments and see where the weak points were in them. Let us then by your kind aid interchange our ideas, and thereby do something to help legitimate mining. Having this end in view let us turn to the valuable list of "Dividend Mines of 1878," compiled by Mr. Ashmead, and published by you in the *Mining Journal* of the 22nd ult. The first thing that strikes the eye when we look at it are the words Cost-book and Cornwall, and the more we look into the matter the more striking the fact becomes. In Mr. Ashmead's list we find 27 mines paying dividends in 1878, but three of these have paid guaranteed dividends, and for practical purposes may be excluded. So we have 24 left, out of which 50 per cent. are Corrish mines, and 11 in 12 of them cost-book Cornish mines. But let us look a little further into the matter and we shall find that out of the entire number of mines quoted in various lists only about 15 per cent. are Cornish, yet this 15 per cent. furnishes 50 per cent. of the dividend mines of 1878; but this is not all, if we look at the lists of a few years ago we find few of the limited companies that now appear, while the cost-book mines have stood the test of time, and if we examine into the prospects of these we find seven in ten of them only waiting for a rise in price of metals to enter the dividend list, while the bulk of the limited companies are in a very different state. So far we have looked at facts easily collected by a little trouble, which clearly points in one direction—Cornish Cost-Book Mines.

Now, Sir, let us look at our own ventures, and what lessons do we learn? If you will allow me I will give a short account of mine, and no doubt it will represent the experience of many. Between 1868 and 1873 I became connected with 17 progressive mines—of these six were cost-book and the rest limited companies with most promising prospects—and of these five, after expending their first capital, were reconstructed, so we may safely say the numbers were—cost-book, six; limited companies, sixteen. Now, what has come of them? I have four left—three cost-book, one limited company. Of the cost-book mines two are and have been honestly and well managed, and will soon become very valuable properties. One was not managed very well; the purser and secretaries tried to hoodwink us, but owing to the power adventurers in cost-book mines have (if only they use it) we were able to give them the right about, and now we have, I believe, honest men to deal with, and the property looks well, and when tin gets more money will pay us well. The other three were honest, fairly proved trials, and then given up as not likely to succeed. I hear one of them is to be shortly placed on the market as a limited company. I need hardly say I shall not take shares. The capital expended on the first three is about 70,000*l.*, and on the last was about 13,000*l.* Now, as to my limited companies. Their first capital was about 600,000*l.*, and their reconstruction made them nearly 1,000,000*l.* Where are they? One I find is still alive, but only. I got 2d. in 1*l.* dividend after one was wound-up, and 1s. per share from another as dividend, but it was paid out of capital, as within six months after more capital was endeavoured to be raised, when it was found out that the 1s. dividend was only paid to give the shares a market value, so that those in the secret could dispose of the shares they held at a premium. Now, I do not say there are no good limited companies; there are. I only allude to limited companies formed to prove new sets or to re-open old ones. My experience has been that such companies are not conducive to success. Let us see if we can find the cause.

Perhaps it may aid us if we take notice of another agency besides cost-book and limited companies employed to open out mineral wealth—that of private enterprise. In this class we find some of the most valuable properties, and may take it as a fact that mines started in good country, with plenty of capital and determination, under personal control, seldom if ever fail; and we may go further and say that properly conducted and looked after Cost-Book Mines, inasmuch as they resemble well-managed private properties, come close upon them in point of success. The only weak point in Cost-Book Mines is the same that we find in private enterprise—that is, neglect to look after our own interests—but we have in them all that tends to success, if only we exercise the same spirit that we employ in our every day affairs—take an active interest in them, see that there is no concealment either in the working or the accounts, that the captain, purser, and secretary allow you to freely examine into all connected with the mine as you expect to be allowed in your private affairs (this an adventurer can demand), and should any one engaged in the concern demur, why "take the bull by the horns" and vindicate your authority. Now, in limited companies no such power is in the shareholders' hands; the directors are masters, except so far as they are the creatures of the secretary and brokers, and suppose you take an interest in one you are still obliged to pay up in full before you can get out, although ere you were in it a week you could see that it was formed solely for the purpose of enriching the promoters and their friends. I have found it in many of my defunct companies that it is the "old, old story." The sett is bought for a few hundreds, sold for as many thousands in cash or shares, the bulk of the money subscribed by the outside public is squandered in preliminary expenses, directors' fees, and office expenses, sometimes in machinery, before it is needed, which lays idle till the company is wound-up, and then sold with the sett to some friend of the liquidator for a tenth of its cost in time to be re-introduced to the public with a new name. (By-the-bye it would be a grand thing could investors consult a list of the various names the same setts have been known by, it would open our eyes.) The market is already being stocked with new (?) ventures. I have this week got three, and one I think I recognise as an old friend under a new name. It is in the same county, the same promises of reaching rich deposits, also self-drained, but in my experience I found that although all the money of the shareholders was swallowed, yet the only rich "flats" were those who lost their money. I do not say all directors are deliberate deluders of the public, but the bulk of them are creatures of the promoters, and who carelessly take their salaries, but take little interest in the company; in fact, they have more interest in being on the board of many than in the careful management of any one. This is one of the rocks on which limited companies are wrecked. Another is generally, no one shareholder has such an interest as to neutralise the power of any plotting clique, and another is that the bulk of shareholders in limited companies are not wealthy, place all their spare cash in at first, and when more capital is needed cannot respond when, after a few efforts, the end comes. This is the frequent history of limited companies formed to prove setts. However safe it is to enter a good dividend company with ample reserve funds and a practical interested directorate, all with only a limited purse, should avoid progressive mining, particularly limited companies with flaming prospectuses, promising certain prizes. Shafts down to rich lodes, only filled with water, any quantity of halvans at bank only waiting to be made marketable, deep mines drained with mysterious swallows, and such like baits. Avoid all such. Should it turn out that some metal is got, as a rule it costs five times its market value, and only tends to glut the market without profit to the owners. Should it happen that anyone with spare cash should like to reap the often large fortunes secured from proving setts, there are plenty of companies at present only waiting a little more capital to make them profitable. I will not name any, in case I may be accused of puffing, but they can be found in each of our mineral-producing counties. As for myself I shall, having learned by experience, devote my attention to the progressive Cost-Book Mines of Cornwall. J. B.

March 11.

THE IMPROVED PROSPECTS OF MINING.

SIR,—The careful reading of your valuable Journal of the past few weeks is peculiarly interesting to those who are actively engaged in the industries of the country, and more especially to those immediately connected with the metal trade. Whether we turn to the mine agents' reports, the weekly articles, letters from your correspondents, reports of meetings held, or the state of the metal markets, everything is expressive of an established improvement, and a decided opinion that still much better times are near at hand, and stands in marked contrast to the despondent despairing tone of every writer a few months since. Within the last few weeks I have had occasion to visit the principal manufacturing towns of the kingdom, and am delighted at the generally improved condition of business matters and the assurances I received on all sides that the commencement of a period of great prosperity has been entered upon.

Every mineral has an upward tendency, but lead and tin, perhaps, already more positively than others. Soon, therefore, without question many mines of these minerals will be started. Already the Devon Silver-Lead (the Reed) Mine is having capital prepared for its effectual development. Mr. Salmon, of Ulverston, has so often and elaborately described it in the Journal that I need not refer to it in a lengthened manner, but will merely remark that, independent of the underground department, the prospects of which are second to those of no other silver-lead mine, the immense heaps of halvans lying at surface, which can be dressed at a cost of 10s. in 1*l.*, render the property a most valuable one, which will give enormous profits. Herodsfoot Lead Mine, again, near Liskeard, which was bought about a month since for less than 2*l.* per share already sells at a profit of nearly cent. per cent. to the purchasers, and I venture to say will advance in value from 50 to 100 per cent. further during the next 12 months.

In tin mines it is needless to refer to those on the northern side of the Carn Brea hill, in the district of Redruth, their returns speaking sufficiently loud, but the improved position of those on the southern side is a matter of great satisfaction. I am very much pleased indeed that the plucky shareholders in Wheal Grenville are about to be rewarded for their patient perseverance, and Captain Hodge for the skill he has displayed. From this mine to the western extremity of Gwennap everything denotes a prosperous future. The Bell Vean Mine, in the latter parish, will assuredly prove a great success, and a means of vast wealth to the proprietors. It contains such a number of lodes proved rich in the surrounding mines that it cannot fairly be deemed a speculation. Penstruthal, too, on the west, is a fine property, and the 34 fm. level driving east towards Bell Vean, having greatly improved, decidedly enhances the value of the latter mine. The two western counties will assuredly see palmy days again.—*March* 12. CORNUBIA.

REDUCING SULPHIDE ORES WITHOUT FUEL.

SIR,—Unfortunately neither Mr. Hollway nor Mr. Alfred H. Allen have put forward any statement in their replies to my letter calculated to convince practical men that there is really anything substantial in the process recently discussed before the Society of Arts. Not being unacquainted with copper smelting, I am constrained to say that Mr. Hollway is perfectly accurate in asserting that "providing suitable fluxing materials are added, the heat being sufficient, a slag will be obtained of such specific gravity that the complete separation of the regulus must follow as a matter of course;" but Mr. Hollway has proved beyond doubt that when his process is used it is, at present at least, impracticable to regulate the proportion of ores and fluxes in such a manner as to secure the desired separation of the regulus and slag from each other and leave the former in a marketable condition. I have read Mr. Hollway's paper carefully and thoughtfully from beginning to end, but fail to discover that he even claims to produce good marketable regulus or marketable copper in proportions at all corresponding with the quantity of mineral treated. If I am in error I shall be glad to see Mr. Hollway's refutation in the Journal.

With regard to Mr. Alfred H. Allen, whose science is only surpassed by his politeness, I can only say that I feel his chastisement acutely. He states that the proverb says "Women and fools should never be allowed to see an unfinished work," and as there are certain anatomical objections to placing me in the former class I presume he places me in the latter. It does not grieve me, for it is equally well known, to quote another proverb, that "Children and fools speak the truth," which is not always the case with others. Mr. Allen states that Dr. Roscoe and some 20 more witnessed an experiment lasting ten hours, in which the contents of the converter were kept in a molten condition, and 18 tons of cold pyrites (besides sandstone) were added, and yet the only source of heat was that derived from the oxidation of the sulphur and iron of the pyrites used. Further comment is useless, until Mr. Allen states how much fine copper the 18 tons of cold pyrites contained, and how much regulus (and of what produce) was produced. Mr. Allen may be right in charging me with ignorance, but I have not intentionally misstated the case. I admit that "Women and fools should never be allowed to see an unfinished work," but the misfortune is that these unfinished works are too often cried up in the hope of securing outside capital to enable the experiments to be carried on, the result being by far too often that the "women and fools" lose their money, although practical men can see at a glance that the prospects of success are not worth consideration. MINER.

Truro, March 11.

MINING IN CARDIGANSHIRE.

SIR,—Such correspondence as that under the heading of North Cardigan and Salop, &c., calls for some remarks from all interested in mining in this county. Our opinion here is that no sane gentleman would have put forth such questions as the writer did to Mr. G. H. Keene in the Journal of March 1, unless he was a holder of a large stake in the concern; and even if one held any amount of shares in the undertaking he would scarcely be justified in putting forth such queries through the medium of your world-wide circulated Journal. Those who know the history of the Esgair-hir and Esgair-fraith Mines (which mean the Cambrian Mines), and include the recent very rich discoveries of lead and copper made by the present management, are well able to judge the value of that extensive tract of mineral ground without the assistance of such a scrutineer as your correspondent seems to be, whose principal motive—judging by his correspondence—is to depreciate the Cardiganshire mines (although he denies this), and to prevent people from providing capital to develope its mineral wealth, of which these old hills surrounding the place where I write is pregnant; and when we consider the shallow depth attained in the Cardiganshire mines, as compared with the depth of mines in other counties, we must arrive at the conclusion that our Welsh mines are only in their infancy. If your Correspondent would but make himself acquainted with the real merits of some of the Cardiganshire mines, which it appears to me he has not done, he would find such mines as Bwlch United, Tyn-y-Fron, the Temple, South Cambrian, Cwm Brwyno—and many others that I could name, from their position and comparatively shallow workings, and the rich courses of ore found in them—present such opportunities for the investment of capital at

the present moment as may never again occur in this or any other county in Great Britain.

In concluding this letter I cannot refrain from stating my opinion that your Correspondent knows as much, and no more, about the mines of Cardiganshire as the mines know about him. He seems to have picked up a good smattering of knowledge of geology, mineralogy, and theoretical mining, and in saying this I say all, for his practical knowledge is less than nothing, and proves the old adage, "that a little knowledge is a dangerous thing."

March 12. MINER.

RETROSPECT—No. II.

SIR,—The following couplet is very commonly expressed in all grades of society:—

"Order is Heaven's first law, and this confessed,
Some are, and must be, greater than the rest."

To keep all men at the same level would be an utter impossibility even for a day. Some would be sure to rise and some to fall in the scale. I have known men left with large fortunes (one with a million in money and a hundred thousand a year besides) come down to poverty, or dependence on friends for a bare subsistence, or to die in a garret, like one nobleman did in the last century. The late Mr. John Williams, of Scorrier, as I said in my last, was left by his father with a legacy of 1000*l.*, which he so husbanded as to make it at the time of his retirement from business something approaching a million! Riches almost invariably give power and influence over the population surrounding the residence of a rich man, especially if the rich man is also good, as Mr. Williams was acknowledged to be by all who knew him. He was liberal to the poor, he was a peacemaker, often healing breaches between men and their wives, who had separated from one another in quarrels. For this kind of good office people used to say that Mr. Williams had re-married the parties! He certainly did a great deal of good in that way, and in the reconciliation of belligerent neighbours—"Blessed are the peacemakers." As he acquired wealth he used it in the employment of labour, especially that of miners, of whom he had many thousands engaged at the same time in the numerous mines which he started and controlled. I will mention a few out of many mines which were under his direction, in conjunction with his sons Messrs. John, Michael, and William—North Downs, Cardrew, Treskerby and Wheal Chance, Wheal Damsel, East Damsel, Tingtang, Consols (prior to Messrs. Taylor), United Mines, Wheal Maid, Poldice, Wheal Unity, Wheal Unity Wood, Beam Mine, Godolphin, Union Mines, Wheal Jewell (old), some mines in Calstock, Ireland, and elsewhere, nearly all of which are now idle, but out of some of which Mr. Williams realised enormous wealth.

Burncoose, late the residence of Mr. John Williams, jun. (deceased), now the property of Mr. J. M. Williams, came into the William's family early in the last century. I think that almost the first important purchase made by Mr. Williams was that of the Manor of Calstock, from the Duke of Cornwall, about the year 1807. Before his second marriage in 1829 (which gave great umbrage to his family, and occasioned his leaving Scorrier), he purchased some estates in Stithians, which, with numerous other valuable farms, belong now to Mr. J. M. Williams. When Mr. W. married Miss Edwards he retired to Sandhill, near Gunnislake, where he died. At or immediately before the marriage the firm was altered from "John Williams and Sons," to "John Williams, jun., and Brothers," and so continued till the death of Mr. Michael Williams in 1858. While Mr. Williams, the elder, lived at Scorrier he was the sovereign of Gwennap! His possession of nearly all the mines in the parish gave him great power in parochial matters. When he left, the power was exercised by Mr. Michael Williams, and after his decease by Mr. (the late Sir) William Williams. Now that all the mines are idle the kingdom has ceased—there is now no king of Gwennap! Every man now does that which is right in his own eyes. Messrs. C. and J. Harvey also exercised considerable influence because of their connection with the Messrs. Williams's mines. "Every dog has his day!" They (the Harveys) are all gone! Wheal Squire is in the land of Mr. E. B. Beauchamp, Trevince. It has not been worked within the last 52 years; I suppose it has been idle 70 years. I was informed that in its richest days the dues paid to Mr. Josh. Beauchamp therefrom amounted to nearly 10,000*l.* per annum. The time for a re-trial, if at all, was during the working of Clifford Amalgamated, when the water was low, there being a connection between the both mines at Poldory.

Above I gave a list of some of the mines under the management of Mr. Williams. I will subjoin the names of those which yielded the largest profits, according to the information I received:—

North Downs	£ 300 000
Cardrew	30,000
Treskerby and Wheal Chance	250,000
Wheal Damsel	200,000
Tingtang	50,000
Consols	unknown
Godolphin	90,000
Wheal Jewell (old)	300,000
Wheal Jewell (new)	200,000
Wheal Maid	unknown
Beam	10,0000 (?)
Total	£1.520,000

Mr. Williams is said to have derived large profits from Irish and foreign mines. It must not be understood that Mr. Williams held the entirety of the mines above mentioned, but he held very largely in all of them. The late Mr. John Blamey, the cashier at Scorrier office, informed me that one million sterling passed through his hands annually. He also told me that the introduction of the penny postage stamp saved the office 1000*l.* per annum! Mr. Blamey was in the office about 60 years, and Mr. John Pearce and Mr. H. Sims, about the same period, contemporaries.

After the demise of Mr. Michael Williams, when Mr. George Williams, his third son, became the owner of Scorrier, the business was removed to a new office, built by Mr. Wm. Williams on a piece of waste attached to Tregullow, his seat. Since then a new mansion has been erected at Scorrier by Mr. George Williams, who has since acquired, by purchase, some adjacent freehold in Tolgullow, where a ropery business was formerly conducted by Messrs. Ed. Hawke and Co., but is now extinct, and Mr. Hawke is dead.

Mr. J. Williams, of Scorrier, had the following children—sons: John, Michael, William and Edward; and daughters three. One daughter was married to Mr. Tucker, of Trematon Castle; another to the Rev. Josiah Hill, a Wesleyan minister; and the third died almost suddenly in 1829. Mr. Edward Williams died, I believe, shortly after his marriage, but he left a son who is now living at Honeycombe House, in Calstock, where he pursues his favourite pleasure of hunting.

When Mr. Williams married—if not just before—he assigned all his effects to his three sons, reserving to himself a life annuity of 1500*l.*, and an annuity of 300*l.* a year to his widow during her life.

I think that I said in a former communication that the grandfather of the late Mr. J. Williams commenced the Gwennap Great Adit in the year 1748—the same year that the first steam engine was erected in this county, at Wheal Vor.

Wheal Vor was resumed by Messrs. John, Thomas, James, and William Gundry about the year 1810. In June, 1815, I went there to see the starting of Woolf's steam stamps, erected by an engineer sent down from Neath Abbey expressly to do it, so unaccustomed were Cornishmen at that date to mechanical work. Now they are equal, if not superior, to all others for the manufacture and structure of all kinds of machinery. In the year 1819, when Wheal Vor began to be rich, Messrs. Gundry were made bankrupts; but the mine yielded 272,000*l.* profit to those who purchased the shares.

In the year 1816 a company, consisting principally of poor men, was formed for working a little mine near Wheal Vor, called Wheal Rose *alias* Polrose, which is now at work under the latter name. It was very shallow, and a small engine brought from Trevenen Mine, in Wendron, was set up to pump the water. In a very few months there was ready for the smelting-house 300*l.* worth of black tin. My father being the purser I went with him to the smelting-house at Treloweth, and dined at the "Lamb and Flag," with the smelting-house cashier, Mr. Phillips, who died at Penzance about 20 or 30 years ago. It was my first and last visit to a smelting-house on such an occasion. The adventurers were not only poor, but ignorant in the extreme. Of their ignorance I will give you a specimen. You are aware that mining companies supply the miners with powder, shovels, pick hilts, &c., for their use underground; and that on pay-days the charges for all such supplies are deducted from the men's earnings. Of course my father did this. The stupid adventurers (some of them) alleged that my father was putting into his pocket all the amounts so deducted, and would not be satisfied until a disinterested agent had certified to the contrary. Capt. T. Carter, then manager of Wheal Breage, was employed to examine the cost-book, and to certify thereon. He quickly stopped their cavilling by stating that everything was fairly done. The mine was worked only till about the end of 1817, when it ceased because the adventurers were generally too poor to respond to calls: 1816 was a remarkable year, because of the remarkably bad harvest—nearly all the grain being destroyed, or seriously injured, by the continuous rain during the harvest month. Between the outlay on the mine and the loss of the grain my father lost considerably that year. I remember that cakes made of the flour would run out, partly, under the edge of the "baker!" Good bread was scarce. All the adventurers in Polrose are dead. My brother used to tell me, for many years, that Polrose should be worked again—that he felt sure it would pay. He never dreamed of tin coming down to what, alas, it is! The mine is now worked on a small scale, waiting for better times for a more vigorous prosecution.

I hope—against hope—that a little better price for tin is in the future; if so, this mine will live, and many others which are at the point of death will have a longer existence. But if an increased price should not become a fact ere long, very few tin mines will continue to work. That such a mine as Carn Brea has stood against such bad prices is almost a wonder. The same might be said of several others, which have been dragging out a miserable existence.

March 10. S.

MOLD MOUNTAIN.

SIR,—This famous mountain is destined ere long to be the most productive in Wales, for capitalists are finding out that immense deposits of lead ore exist undeveloped, and in order to fully work them, are consolidating small grants on the same great bearing lodes, and thus at one stroke saving half the expense in management and pumping power. This will be the case at Gwernymynydd, Westminster, and Plas-ddu mines, which are on the same geological formation and bearing as the celebrated Minera Mine, and like it, before re-starting in 1849, only require the deep adit levels continued to be equally profitable. MINING ENGINEER.

PENSTRUTHAL MINE, AND ITS PROSPECTS.

SIR,—A letter under the above heading appeared in last week's Journal, signed "J. E.," and dated March 5. It is a very libellous letter, and it becomes my duty to contradict some of its statements. Instead of "about half a dozen men," there are now, as there have been for a long time, about 30 men working underground. The company have raised additional funds, and are expending them judiciously, under the direction of an able and vigilant board of directors, and there is no waste of money or time whatever. There is nothing owing to the person referred to in the letter as the "vendor," he is only one of three persons whose names were originally inserted in the leases as nominal or bare trustees for conveying the company's interests from the lords to the company, and the so-called "vendor" has not any beneficial interest whatever in the property. The said letter is apparently inserted by him, or at his instigation, or by some person unacquainted with or who has misstated the facts. The person referred to as the "vendor" stated at a large meeting of shareholders of the company, held at the Guildhall Tavern, London, July 17, 1877:—"I will hand over everything, add make an assignment if I have not done it. You shall have my purchase-money and shares, and deal with me as you please." A shareholder rejoined—"It is obvious that such claim is against Mr. Greene, and not the company."

[The above is quoted from the reporter's notes of the said meeting.]

The undersigned concedes to "J. E.," as stated in his said letter, that—The mine presents every prospect of a great success, and with good management and a further small sum expended judiciously might be properly developed. The set is principally virgin ground, and the numerous lodes running through it are generally rich, and as far as have been seen have the appearance of permanency.

Company's Offices, Cornhill, March 10. E. ASHMEAD, Secretary.

LEAD MINING IN SARK.

SIR,—The following particulars of mining in Sark may interest "Curiosity," whose letter appeared in last week's Journal. The mines were near Port Gowray. There were two lodes, one silver-lead and one copper. They ran from N.E. to S.W. in felspathic and hornblendic rocks containing much chlorite, and probably of Llandeilo age—the age of the lead-bearing strata of Shropshire and Cardiganshire. The silver-lead lode varied in width from 1 ft. 5 in. to 11 ft., averaging 6 ft. The copper lode ranged from 2 ft. 5 in. to 5 ft., averaging 3 ft. 9 in. The lodes were made up of the ingredients of the adjacent rocks, together with calcareous spar in strings and masses, granular quartz, veins of coarse jasper, and masses of agate. The lodes were also charged with iron pyrites and earthy brown iron ore, the latter giving place to the former in depth. The silver lode in the N.E. portion contained to a depth of 24 fms. a preponderance of lead ores with galena at the base, this became mixed with antimony in depth, and was replaced by various ores of silver—earthy, black, vitreous, and red, together with copper ores. This lode was worked 64 fms. from surface and 40 fms. below the sea level. The argentiferous lead ores produced 20 to 85 per cent. of lead, and from 30 to 300 ozs. of silver. One sample 54 fms. from surface gave 530 ozs. silver to the ton of ore. I am not informed concerning the commercial history of the company, or why the mine, apparently so rich, was abandoned. D'ELGO.

HERODSFOOT MINE.

SIR,—By your permission I will give your readers and shareholders the impressions made on my mind from a third visit to the mine on Wednesday last. The surface is gradually undergoing a change. Wire ropes instead of 300 fms. of chain, weighing 3 tons, are being substituted, weighing 15 cwts. each, thus facilitating a discharge of double the quantity of lead ores from below. Buddles and frames as well as jiggers are to be erected forthwith for the working of the thousands of tons of halvans and slimes accumulated on the mine. From the surface alone any visitor may see that a very handsome profit to the adventurers can be made by availing ourselves of the abundant water power. I have no hesitation in asserting that hundreds of tons of silver-lead will be rendered marketable at a trifling cost as soon as suitable dressing machinery is erected.

The pumping-engine has been thoroughly examined, and when the balance-bob at the 100 or a water balance has been put in the pumping arrangements may be said to be satisfactory. The lode at the different points underground continues its average value, the 205 end south being worth 18 cwts. per fathom. The 190 north is a most promising end, producing rich stones of silver-lead. As there are about 250 fms. of virgin ground between the Old Herodsfoot Mine which made such large returns to the north, this point becomes of deep interest. A rise in back of the 160 has been commenced, and rapid progress is being made in a lode 2 ft. wide, which more than pays its cost. This rise is intended to communicate with the shaft sinking below the 100 with a view to putting down a double tramroad and a dry rod to the 205, below which the shaft will be sunk on the course of the lode, and thus open up another level in less than half the usual time and cost. This rise is going through virgin ground, and is promising for good deposits of lead.

Under vigorous management we may expect to see Herodsfoot Mine again return 40 tons of silver-lead per month, which will leave a good profit and dividends for the shareholders. Never was any mine transferred from one company to another, and operations carried on at so little cost to the shareholders as the present Herodsfoot Mine. The same economy will characterise the management throughout. The funds in hand are ample to erect such improved machinery as the resources of the mine demand. Shareholders may, with confidence, wait the result. H. WADDINGTON.

March 13.

INVENTORS, AND THEIR REWARD.

SIR,—In your short notice of my paper dated Feb. 17, which appeared in the Journal of March 1, occurs the following:—"He has shown an utter absence of that commercial ability which was essential to keep a satisfactory balance at his bankers." These same sentiments had a prominent position in a short notice that appeared in the Engineer of May 31 last at page 390. I hope, therefore, you will give insertion to the following considerations, which are that this inventor, as your pages have indicated, was commercially in the same position as the English soldiers at Isandula—that is, overpowered and crushed; hence no comparison can be set up between his case and general commercial transactions. The true test is what did the man do under the circumstances that surrounded him? Here please recollect the inventor is by law a slave, and his productions are anybodys but his; and in this case he had to make the property upon principles and out of materials that the public mind neither understood or cared to understand. The consequence was that those whose interests he was advancing were passive, but envy, avarice, and cunning have always an interest opposed to that of the public, and from these graces come the patent laws. Thus you find the cardinal point of those laws is to make the inventor a slave in the eye of the law, by denying his right to the productions of his labour and capital. This isolates his interests from the rest of mankind so as to destroy the common sympathy that is the result of the mutuality in wrong and suffering from oppression. Having thus severed God's binding link we have substituted the statute link called monopoly, and all the other wrongs follow as a necessary consequence, and the grace-made law produces what it was intended for, which was to serve the graces. Thus you have even now proposed at the same cost and for the same term protection for such invention as under notice, and the most trivial matter, whereas 12 months is better protection to the latter than 21 years to the former. Indeed, no man that has had the experience to enable him to form a sound commercial opinion would risk a shilling upon a 21 years protection in the production of such as the latter upon the hope of commercial success, as by the time the property was made and appreciated it would be confiscated. Should any person interested desire to see the pamplet, I shall be happy to forward it upon application.

35, *Great Western-terrace, W.* THOS. CRADDOCK.

[For remainder of Original Correspondence, see to-day's Journal.]

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the markets have been inactive. A disposition, however, is arising to take a more cheerful view of the future as regards a revival of trade, and seeing the settled state of politics, investors are encouraged to take advantage of the favourable opportunity of a time like the present of doubt and uncertainty. The general condition of trade is unaltered, but after such a protracted winter the return of fine weather should make things a little brisker, especially with the money market at easy rates. Transactions now entered into are for settlement March 31, and this account, therefore, opens with more favourable prospects.

In shares of coal and iron companies, Ebbw Vale have advanced 5s. per share, but Lochore and Capledrae have fallen a similar extent. Benhars continue almost neglected at 13s. 6d. to 14s. 6d., only a small sale having taken place at 15s. The meeting of Bolckow, Vaughan, and Company will be held on March 21. The sales of the Scottish-Australian Company for December have been 16,867 tons, making for the half-year then ended 111,590 tons. Andrew Knowles and Sons are at 10½ dis. Ashbury, 54 dis. Bolckow, Vaughan, A, 54; ditto 5 per cent. preference, 19⅝. Brown, Bayley, and Dixon, 9⅛ dis. Cardiff and Swansea, 15s. to 25s. Charles Cammell and Co., 15¼ dis. Ebbw Vale, 70s. to 80s. John Brown and Company, 23 dis. Midland (new) 95s. dis. Muntz's Metal 52s. 6d. prem. Nerbudda, 15s. Newport Abercarne, 5. Omoa and Cleland, 5s. 6d. to 7s. Parkgate, 25 dis. Rhymney, 13. South Wales, 60s. Staveley, A, 20s. dis. Thorp's Gawber Hall, 10s. to 20s. Tredegar, A, 14.

In shares of foreign copper and lead companies, Tharsis are 3s. 9d., and Huntington 3s., both lower. Tharsis touched 2¼, but are now firmer. The Cape Company have declared a dividend of 12s. 6d. per share, payable March 25. The advices to hand from Yorke Peninsula state that, apart from the low price of copper, the mine is making good progress. The ore returns comprise 271 tons of 15½ per cent. at the mines, of which 100 tons dressed up to about 18 per cent. were about to be shipped, 450 tons smalls of 5 per cent., and 1050 tons dredge ore of 5 per cent. The Hultafall shares are in request. Rio Tinto 5 per cent. about 60. Yorke Peninsula (pref.), 10s. to 12s. 6d.

In shares of home mines Glasgow Caradon have advanced 1s. per share. The next sale of copper ore by this company is computed 190 tons, to take place on March 20; this is the same quantity as was sold last month, 20 tons less compared with March, 1878, while in the same month in several years prior the sales were from 240 to 260 tons. Lead and tin mine shares are generally higher in price. Rhydalun shares are the best investment in this department, as the mine is considered better than North Hendre. When they are able to make good profits with lead at 8*l.* 15s. per ton, it is evidently a first-class chance. The company is being altered from the Cost-book System to Limited Liability, the original shares, now at 36*l.*, being exchanged for 40*l.* fully paid in the limited company. The directors are appointed, and the company will be registered without delay. Prince Patrick shares are also likely to advance considerably in price on account of the great success the mine has attained through the extraordinarily rich body of ore cut into last October. An encouraging report has been received from West Tankerville (now East Roman Gravels). Cwm Brwyno and Temple offered, also Gorsedd and Merllyn Consols. Great Laxey, 16½ to 17. Gunnislake (Clitters), 7s. 6d. to 12s. 6d. Leadhills, 40s. to 50s. Pant-y-Mwyn, 40s. Tincroft, 10. Van, 20. Victor, 20s. Wheal Crebor, 3s. 9d. to 6s. 3d.

In shares of gold and silver mines Richmond have advanced 1s. 3d., and have sold all the week much about the same prices. This week's run is [$400] smaller, at $56,000; estimated profits in February, $50,000. The Pestarena United gold returns for the past month are 400 ozs., the average per ton amalgamated being 11 dwts. 5½ grs. The profit at Port Phillip for month ended Jan. 1 has been 706*l.* The produce of Don Pedro in February was 1000 oits. Chicago, 10s. to 17s. 6d. Colorado, 35s. to 37s. 6d. Chontales, 12s. 6d. Eberhardt, 70s. Emma, 2s. 6d. Exchequer, 3s. 9d. Flagstaff, 2s. 6d. to 5s. Frontino, 50s. Rossa Grande, 2s. St. John del Rey, 270.

In shares of oil companies Uphall have advanced 12s. 6d. per share, and Oakbank 2s. Young's Paraffin have remained at 14*l.* 5s. to 14*l.* 6s. 3d. all the week. Price's Patent Candle shares higher at 10¼. At the meeting on March 27 a dividend of 12s. per share, or at the rate of 3 per cent., will be recommended on the ordinary shares, carrying forward 1190*l.*, which will raise the amount of undivided profits to 7029*l.* Runcorn Soap and Alkali, 7⅛ dis.

Shares of miscellaneous companies are quite neglected. Native Guano are at 62s. 6d. In shares of wagon companies Scottish have fallen 1*l.* on the old issue, and 5s. on the new shares, being now offered at 8*l.* and 3*l.* respectively. Prices of others are—Bristol and South Wales, 6½. British, 5s. prem. Gloucester, 7¼. Starbuck, 12. Swansea, 40s. In shares of chemical companies the quotations are—Langdale's, 55s. to 57s. 6d. Lawes', 8¼. Newcastle, 17s. 6d. to 20s.

MONKLAND IRON AND COAL COMPANY (Limited).—The report of the directors of this company for the meeting on March 18 states that the operations of 1878 have resulted in a net loss of 3720*l.*, which, added to last year's balance, makes 7953*l.* now against the revenue of 1879. Revenue has been debited with 10,000*l.* for depreciation, as in previous years. The outlay on works, pits, &c., has been 4093*l.*, and these are all in efficient order. The debenture debt has been reduced during the year by 2100*l.* The sum of 4700*l.* has been paid off, 2600*l.* issued, and 14,150*l.* renewed. The position of the company is as follows:—Total indebtedness, including debentures, 93,509*l.*; stocks, sundry debtors, &c., 68,376*l.*; difference, 25,733*l.*, against which stand the pig and malleable ironworks, railways, houses, fixed and moveable plant, pits, and mineral leases. The debentures are thus shown to be perfectly secure. The directors express their thanks to the mineral owners and the railway companies for their concessions in rents, lordships, and railway dues, which will assist the company in tiding over the present depression in the iron trade.

BROWN, BAYLEY, AND DIXON (Limited).—The annual report for the meeting of this company, on March 26, shows a net profit of 21,700*l.*, including 1439*l.* brought forward. After allowing for depreciation and interest on debentures a surplus is left sufficient to pay 13 per cent. dividend, but the dividend recommended is only 5 per cent., and this enables 10,000*l.* to be placed to reserve, and 3956*l.* carried forward. The directors allude to the severity of the depression of trade which still continues, and occasions a further decline in prices. The difficulties encountered in manufacturing businesses are very great, they add, but important economies have been effected which they feel assured will place the company in a good position to meet the severe competition of the day.

THARSIS SULPHUR AND COPPER COMPANY (Limited).—Two anonymous undated circulars, evidently emanating from the same source, have been issued about this company. Some people want to know the meaning of the parties going to great expense in sending out such circulars showing that Tharsis shares will fall. Anyone can surely perceive that if they were philanthropists taking such a deep interest in Tharsis shareholders, the majority of whom they cannot know, they would not be ashamed to disclose their names. On the contrary, they are simply parties who have sold what they do not possess, consequently their game is now to try and frighten holders to sell at low prices, so that they may profit by the misfortunes of others. Most of their alarming statements have no other existence than in the inventive minds of themselves, the authors of them. It is to be regretted that there are men who will divert their talents to such disreputable practices from the purpose for which they were granted them—honest and legitimate industry. It is well enough known that this is not a good time to sell anything

in the mining line, and those who can afford to wait will not sell out of a good concern like the Tharsis just now on any account. It may be pointed out that if those adverse speculators can afford to spend so much money in endeavouring to frighten shareholders to sell their shares they must consider it the right time to buy. There is, perhaps, some special reason for the shares improving of which they have obtained early information.

HUNTINGTON COPPER AND SULPHUR COMPANY (Limited).—The action recently raised by this company against the original directors is said to have been abandoned, the defendants agreeing to pay 800*l.* each in cash, each to surrender 800 fully paid-up shares of the company's stock, and each party paying their own expenses in both actions. This arrangement does not include Mr. Huntington, and an independent action is now expected to be raised against him.

The following calculations show the yield per cent. on money invested at present prices in the shares named, based upon the last average yearly dividend being maintained:—In coal and iron companies Andrew Knowles and Sons would yield 10½; Bolckow, Vaughan, A or B, 5. Charles Cammell and Company, 6¼; ditto, 6 per cent. debentures, 6; ditto, 5 per cent. debentures, 5. Henry Briggs, A, 3½; ditto, B, 3½. John Brown and Company, 7½; ditto, 5 per cent. preference, 5. Parkgate, 4½. Scottish Australian, 10¾. Staveley, A, 5½; ditto, B, 5½; ditto, C or D, 4¾; ditto, 5 per cent. preference, 4¾. In wagon companies Birmingham would yield 7½; British, 8⅝; Metropolitan, 7; North Central, 7⅞; Scottish, 6¾; Sheffield, 6¾; and Yorkshire, C, 7¾. In oil companies Oakoank would yield 7¾; Uphall, 3; and Young's Paraffin, 10¾. Glasgow Caradon Mine would yield 2½; Great Laxey, 8¾; St. John del Rey, 12; Tharsis, 8½; and ditto (7*l.* paid), 8½. Among miscellaneous investments Earles' Shipbuilding may be mentioned to yield 9½; Liverpool Rubber, 8; Milner's Safe, 6⅝; United States Rolling Stock, 6⅝; and Val de Travers Paving, 10.

On Contango-day (Tuesday) the following were the rates of continuation current: Contangos—1d. on Benhar, 1d. on Glasgow Caradon, 1½d. on Huntington, 4d., 1s. on Uphall Oil, 1s., 3d. on Tharsis. Backwardations—3d. on Price's Patent Candle, even on Richmond, 6d., 1s. 3d. on Tharsis, and 3d. on Young's Paraffin. On comparing the making up prices fixed to-day for the undermentioned shares with those of the same shares at the previous settlement, the variations thus shown to have occurred during the account are as follows; Uphall Oil have advanced 10s. per share, Huntington 6s. 6d., Glasgow Caradon and Oakbank Oil each 3s, Glasgow Port Washington 2s. 6d., and Benhar 6d.; Richmond have fallen 16s. 3d., Tharsis 5s., and Young's Paraffin 2s. 6d.; Marbella, Monkland, and Nant-y-Glo (new) have not altered.

Capital. Per share.	Paid up.	Dividends. Rate per cent. per annum. Previous.	Last.	Description of shares.	Last price.
				COAL, IRON, STEEL.	
£10	£8	£ 7†	£ 5	Arniston Coal (Limited)	5½
10	10	4	4	Benhar Coal (Limited)	14s. 6d.
100	55	34s6d‖	25s‖	Bolckow, Vaughan, and Co. (Lim.)—A.	54
10	10	10	10	Cairntable Gas Coal (Limited)	5¼
10	10	4s‖ April, 1876		Chillington Iron (Limited)	42s. 6d.
10	10	—	—	Clyde Coal (Limited)	40s.
28	20	10s‖ Dec., 1874		Ebbw Vale Steel, Iron, and Coal (Lim.)	75s.
10	7	nil	nil	Fife Coal (Limited)	75s.
10	10	nil	nil	Glasgow Port Washington Iron & Coal (L)	42s. 6d.
10	10	—	—	Ditto Prepaid	35s.
10	10	—	—	Lochore and Capledrae (Limited)	35s.
10	10	nil	nil	Marbella Iron Ore (Limited)	25s.
10	10	nil	nil	Monkland Iron and Coal (Limited)	16s.
10	10	5	4	Ditto Guaranteed Preference..	40s.
100	100	nil	nil	Nant-y-Glo & Blaina Ironworks pref. (L)	16
6	6	nil	nil	Omoa & Cleland Iron & Coal (L. & Red.)	7s. 6d.
1	1	15	15	Scottish Australian Mining (Lim)	35s.
1	10s.	15	15	Ditto New	16s. 3d.
Stock	100	nil	nil	Shotts Iron	99
				COPPER, SULPHUR, TIN.	
4	4	—	—	Canadian Copper and Sulphur (Lim.)	5s.
10	7	72s 6d‖	35s‖	Cape Copper (Limited)	27
1	1	7½	2½	Glasgow Caradon Copper Mining (Lim.)	20s.
1	15s.	7½	2½	Ditto New	13s. 6d.
10	9¾	nil	nil	Huntington Copper and Sulphur (L.)	20s.
4	4	—	—	Panulcillo Copper (Limited)	25s.
10	10	6†	6†	Rio Tinto (Limited)	52s. 6d.
20	20	7	7	Ditto, 7 per cent. Mortgage Bonds	13¼
100	100	5	5	Do. 5 p.ct. Mor. Deb. (Sp. Con. Bds.)	59
10	10	20	17½	Tharsis Copper and Sulphur (Lim.)	21/ 8s 9d
10	7	20	17½	Ditto New	14¼
1	1	—	—	Yorke Peninsula Mining (Limited)	5s.
1	1	—	—	Ditto, 15 per cent. Guaranteed Pref.	12s. 6d.
				GOLD, SILVER.	
1	1	—	—	Australasian Mines Investment (Lim.)	5s.
5	5	10s.‖	10s.‖	Richmond Mining (Limited)	9¼
				OIL.	
10	7	5	5	Dalmeny Oil (Limited)	6¼
1	1	25	15	Oakbank Oil (Limited)	41s.
1	5s.	—	15	Ditto	11s.
10	10	7½	2	Uphall Mineral Oil (Limited) "A"	6¼
10	10	—	—	Ditto "B" Deferred	10
10	8½	17½	17½	Young's Paraffin Light & Mineral Oil (L)	14¼
				MISCELLANEOUS.	
50	25	5	6	London & Glasgow Engineering & Iron Shipbuilding (Limited)	21
7	7	10	5	Phospho Guano (Limited)	6¼
10	10	6	5	Scottish Wagon (Limited)	8
10	4	6	5	Ditto New	60s.

† Interim. ‖ Per share. * For six months of 1878.

NOTE.—The above lists of mines and auxiliary associations are as full as can be ascertained, Scotch companies only being inserted, or those in which Scotch investors are interested. In the event of any being omitted, and parties desiring a quotation for them and such information as can be ascertained from time to time to be inserted in these lists, they will be good enough to communicate the name of the company, with any other particulars as full as possible.

J. GRANT MACLEAN, Stock and Share Broker.

Post Office Buildings, Stirling, March 13.

GREAT LAXEY MINING COMPANY.

The great difficulty of preventing absolute loss to the shareholders, owing to the present condition of the metal trades, has placed the directors of the Great Laxey Mining Company in the awkward predicament of having to choose between two unpleasant alternatives—the discharge of a large number of the workpeople, and the general reduction of the work and wages all round. As the former course would have inflicted great inconvenience upon many families by leaving the heads of them, who had done nothing to justify their discharge, without employment in an out-of-the-way district, the directors have adopted the latter, and have issued the subjoined notice to all the underground men:—

The unlooked-for continued depression in the metal market, especially for lead, has rendered it absolutely necessary that some important changes should be made in the working of Great Laxey Mines. The insular and English directors have for some time past had the matter under serious consideration, and while working for the shareholders they have not overlooked the interests of the men. The directors have been at considerable trouble to ascertain from thoroughly reliable sources exactly what is being done at the principal lead, copper, and tin mines in England, and they find that in every instance the Laxey miners are in every respect much better off than any other body of metallic miners in the kingdom, and they will undeniably remain so, even when the new regulations adopted by the directors have been put in full operation. It was suggested that a large body of the men should be paid off till better times came round. Seeing, however, that such times may be a long way off, and that great suffering would be brought upon the men and their families by a "pay off," the directors have adopted the following altered mode of working, which they hope will commend itself to the good sense of the underground men at Laxey Mines.

The following regulations are to be put in force on and after the 24th inst., except in the case of bargains already set for the current month:—

That no shift shall be less than eight hours long.

That the morning shift shall commence at 6 A.M., instead of 7 A.M. as at present.

That all underground men shall work six full shifts a week excepting "pay week."

That full shifts be worked on all measuring days.

That Good Friday and Christmas-day be the only general holidays allowed.

That "pay day" be altered from the first Friday to the first Saturday in each month.

That when on "shift work" no miner or labourer be paid for any "shift" not actually worked.

That all bargains be let to a certain number of miners and labourers, but that their joint earnings be divided between the miners and labourers as they may mutually agree when taking the bargain. The money due to the labourers be paid to them through the mine office as at present.

GEO. WM. DUMBELL, FREDERIC BROADBENT, JAMES SPITTALL, PETER WATSON, } Directors.

Douglas, Isle of Man, March 10.

ANOTHER CURE OF ASTHMA (THIS WEEK) BY DR. LOCOCK'S PULMONIC WAFERS.—From Mr. Richardson, Chemist, 11, Bloomsbury, Birmingham—"A customer of mine suffering from asthma used the wafers, and found more relief than from any other (so called) remedy." They taste pleasantly. Price 1s. 1½d. and 2s. 9d. per box.

HOLLOWAY'S PILLS.—The stomach and its troubles cause more discomfort and bring more unhappiness than is commonly supposed. The thousand ills that settle there may be prevented or dislodged by the judicious use of these purifying pills, which act as a sure, gentle anti-acid aperient, without annoying the nerves of the most susceptible or irritating the most delicate organisation. Holloway's pills will bestow comfort and confer relief on every headachy, dyspeptic, and sickly sufferer, whose tortures make him a burden to himself and a bugbear to his friends. These pills have long been the popular remedy for a weak stomach, for a disordered liver, or a paralysed digestion, which yield without difficulty to the regulating, purifying, and tonic qualities.

Meetings of Public Companies.

WHEAL PEEVOR MINE.

A meeting of adventurers was held at the mine, on Tuesday, Mr. T. Pryor (the purser) in the chair, and there was an unusually large attendance, the shares having got into more numerous hands recently. The statement of accounts showed that the labour cost for the sixteen weeks from Nov. 23 to Feb. 15 was 2902*l.*; merchants' bills, 1579*l.*; rates and taxes, 70*l.*; and lords' dues (less income tax), 296*l.*—making a total of 4848*l.* The tin sold during that period weighed 166 tons 19 cwts., and realised 5616*l.*; and besides this there were 120 tons of tin leavings sold, which realised 434*l.*; extra carriage received, 16*l.*; West Peevor supplies, 32*l.*—making a total of 6099*l.*, and showing a profit on the sixteen weeks' working of 1250*l.*

The CHAIRMAN said they would recollect that at the last meeting they had a balance in favour of the mine of 368*l.*, which, added to the profit now of 1250*l.*, would make a balance to be dealt with of 1618*l.* He thought this must be considered highly satisfactory to all the shareholders. Capt. White and he had gone into the matter, and they would suggest to the meeting that out of this balance they should declare a dividend of 7s. 6d. per share. That would take 1125*l.*, and leave 493*l.* to be carried forward in favour of the mine. This, he thought, would also be exceedingly satisfactory. In round numbers they would have a reserve fund of 500*l.*, and he would like to go on increasing this balance, if possible, until they got to 1000*l.* That would be a nice reserve fund to be available for carrying on the mine in the most economical manner, and would be highly advantageous to all. All the tin credited was sold, and the tin bills were on the table. Last year they sold 452 tons at an average of 34*l.* 5s., and that tin was raised at 27*l.* 15s. a ton, so that they made a clear profit of 6*l.* 10s. a ton on the quantity sold last year; or, in other words, about 3000*l.* Their tin sold that day had cost them 26*l.* 11s. 9d. a ton, it had been sold at an average of 33*l.* 12s. 6d. per ton. The last two parcels were sold at 35s. 7s. 6d., and had they got that price for all they had sold, instead of 33*l.* 12s. 6d., they would have been able to make a profit out of which they could easily have declared a dividend of 10s. per share. (Applause.) The following is the agents' report:—

We are still very pleased to inform you that we can report so favourably of the mine. The lode in the 80, driving west of Sir Frederick's engine-shaft, is fully 7 ft. wide, and worth 30*l.* per fathom. This end is opening up a fine run of profitable stoping ground. The lode in the 70 fm. level, driving west, is worth 18*l.* per fathom. The lode in the 60 fm. level is worth 18*l.* per fathom. The lode in the 48, driving west, is worth 20*l.* per fathom. In the rise in the back of this level, west of cross course, the lode is worth 12*l.* per fathom. We expect soon to communicate this with the 36. The lode in the 36, driving west, is worth 20*l.* per fathom. The lode in the rise in the back of this level, west of cross course, is worth 20*l.* per fathom. The lode in the 36, driving east of the main rise, is worth 10*l.* per fathom. The lode in the 26, west of cross course, is worth 18*l.* per fathom. The lode in the main rise in the back of the 26, east of cross-cour (carried 12 ft. long) is worth 12*l.* per fathom. During this month we have intersected the south lode in the cross cut at the 36, about 16 ft. west of engine-shaft; the lode at this point is worth about 10*l.* per fathom. We consider this a very important point, inasmuch as it is 35 fms. east of any other point now in operation. The lode in the deep adit ending, west of cross-cut, is improving as we extend, and is now worth 8*l.* per fathom. We have six stopes working on tutwork, the lode in each of which is worth on an average 12*l.* per fathom. We have also 12 pitches working on tribute, employing 46 men and boys, at tributes varying from 4s. 6d. to 10s. in 1*l.* The fixing of the new balance-bob at the 36 is now being carried on, and we hope in the course of a week or two to complete its erection. We also intend changing our poles at the 30 and 60 fm. levels. When this work is accomplished we shall at once commence the sinking of the engine-shaft below the 80. Although we have had a most severe winter the mine has been kept drained to the bottom, and all operations at the bottom have been carried on without a single let or hindrance. The mine, we are pleased to say, continues to open up exceedingly well, and we hope in the coming 16 weeks to produce a similar quantity of tin to that which we have done in the past.—W. T. WHITE, J. PRYOR.

The CHAIRMAN added that he was sure this report must be considered highly satisfactory, and Capt. White would be ready to answer any questions shareholders might wish to put to him.

Capt. WHITE said there were a few things respecting the mine not mentioned in the report, and which, probably, at this point of the meeting it might not be out of place in him to refer to them. They were well aware that the last 16 weeks' working had been in the deadest part of the winter, and, as was well known, they had most severe weather. In spite of all this their returns in that period were in excess of any former period. He must admit that they were favoured in some respects to what some other mines were in having warm and clean water for dressing their tin with, which was a great thing in their favour in the severe and frosty months of winter. As was seen from the accounts that day, they had sold 167 tons of black tin, and there was the tin contained in the leavings, equal to 16 tons more, which made a total return of tin for the 16 weeks of 183 tons. Now, this he considered, seeing that they had only 32 heads of stamps at work to produce this tin, was a sufficient proof of the productiveness of the mine, and of the stuff it was producing. The quantity of stuff raised in the 16 weeks was about 3400 tons, or 850 tons a month. They stamped every 24 hours about 33 tons, allowing for stoppages in changing heads, lifters, grates, &c., which was of course necessary. Of course to return this quantity of tin there could not be much delay, and they drove their stamps about 14 strokes a minute, or 70 blows per head per minute. This quantity of stuff was drawn by one kibble, and not through a very good shaft either. However, in the course of a short time they would be able to do away with this for that purpose. The main rise referred to in the report they intended for their future drawing-shaft. It was just in the heart of their best tin ground, and was being carried sufficiently large for a double skip-road, and this would be fixed therein as soon as we can effect a communication with it. He was happy to inform them that their prospects underground were very encouraging indeed, and he considered the mine was never in a better position, both financially and prospectively, than at present. Only about ten days ago they intersected the south lode in the 36 cross-cut, near the engine shaft, being nearly 40 fms. east of any other point now in operation. The lode at this point, although not large, was of the same character, and produced good work for tin. Their ends from the 80 to the 26 were all looking well, and opening up profitable stoping ground, and before another meeting they hoped to be sinking their engine-shaft below the 80 fm. level, having one new balance-bob at the 56 now in the course of erection. They had got their valuations per fathom from the 30 to the 80, and these they had now in an end of ground something like 70 fathoms in height, and this at 30*l.* per fathom was something rather beyond the county, leaving alone the district. In the 36 fm. level they had to place a balance bob in a cutting 7 fms. long and 7 fms. high, and this had cost them 250*l.* in labour, all of which was paid. They expected to complete this work in about six weeks time, and before next meeting they would begin to sink their engine-shaft below the 80 fm. level; and, looking at the productiveness of the lode in the 80 end, he believed the 90 would be still more productive, and the 80 had been very productive lately. (Applause.) The lode had varied from 3 to 4 ft., and now it was 7 ft. wide, showing its productiveness in depth as well as in length. Respecting their eastern ground, the lode from the engine-shaft was very important. They should set the end, and drive east and open up the ground in that direction, and improve their future prospects there, and if the ground there turned out as well as that in the south, which he believed it would, they might rest assured that they had a mine which would last for many years. He believed they would be able to show them as good results for the coming 16 weeks as they had in the past, and he hoped they would meet there to have good dividends for a long time to come. (Applause.)

Mr. THOMPSON, of Rotherham, moved that the accounts be passed. He had looked over them, and was well pleased to see the good results of the operations of the past four months. It was twelve months since he had been there before, and he could see that there was a large amount of work done, and there must have been a large amount of money spent, and all this had come out of the profits for the past year. For the past four months they had reason to be satisfied, and they had a very good account. He had made enquiries of Capt. White and looked at the plans, and it appeared that they had been opening up a large amount of ground during the past four months. Captain White would, perhaps, state the amount, and what were the probable reserves, as no doubt that would be interesting information for the meeting.

The CHAIRMAN seconded the motion, and it was carried unanimously.

The CHAIRMAN said the next question was the amount of the dividend. They could easily make a dividend of 10s. per share, but the executive did not advise that. His own impression was that they would stand a great deal better as shareholders by having a good reserve fund rather than dividing every sixpence they earned. By declaring a dividend of 7s. 6d., which would be 2s. 6d. more than last time, their property would be much more valuable than if they declared 10s., and the result would be gratifying to every outside shareholder.

Mr. F. W. MICHELL moved that a dividend of 7s. 6d. be declared. He did not think they could fairly divide more than that, and thought they were fairly entitled to that amount.

Mr. WOOLCOCK seconded the motion, and it was carried unanimously.

The CHAIRMAN said the next question was that of the banking account. They would recollect the unfortunate stoppage of the Cornish Bank, and they were bound that day to appoint new bankers. Soon after the stoppage of the Cornish Bank he had several applications for the account of Wheal Peevor, including one from Mr. Bain, and Mr. Hichens, his partner, being a very old shareholder, he opened an account with them, subject to the approval of the shareholders. It would be for the meeting to appoint them as bankers, or any other persons. He was pleased to see Mr. Charles Tweedy present. (Applause.) Many present would recollect him as Chairman of their first meeting. It had been suggested to him that it would not be exactly nice to appoint other bankers, inasmuch as the Cornish Bank (Limited) was not yet opened. The dividends that day would be paid by the Redruth District Bank, and it would be for them to say whether they would continue the account there or go somewhere else.

Mr. CHELLEW said of course their purser, on the stoppage of the Cornish Bank, could do nothing else than open an account with some other bank, and leave it to the shareholders to confirm, or otherwise, the appointment of the bankers. In order to bring matters to an issue he had much pleasure in moving that the banking account of Wheal Peevor Mine adventurers be opened with the Cornish Bank (Limited) as soon as the company commences business. (Applause.)

Mr. LEAN seconded the motion.

Mr. TWEEDY said he had attended, as Mr. Pryor said, the first meeting when Wheal Peevor Company was originally formed, and he had the honour of occupying the chair, and he had been a shareholder ever since. He had never sold a share in the mine, and he took 50 shares at first, and Mr. Pryor had since allotted him four forfeited shares, and his holding was, therefore, 54 shares. Mr. Pryor could tell them what the original shareholders well knew, that whatever accommodation they required from the late firm of Tweedy, Williams, and Co., they had it—(applause)—and when it was in their power they were only too glad to do everything in their power to forward the mining interests in the county. (Applause.) He would not occupy their time by saying anything about that most unfortunate catastrophe which happened to the Cornish Bank. People must judge for themselves what brought it about; but he would say that the Cornish Bank (Limited) was registered, the allotment letters had been posted that day and the bank doors would be opened for business next Monday morning. (Applause.) Therefore, if it pleased them to pass the resolution which had been so kindly proposed by Mr. Chellew, and seconded by Mr. Lean, they would not have long to wait before the account could be opened at the Cornish Bank (Limited). He had a letter in the pocket from Mr. Ward, of London, who held 640 shares in the mine, stating that he was quite pleased at the step his firm had taken, and hoped every success would attend them, and he would be pleased to give his support to have the account of Wheal Peevor transferred to the Cornish Bank (Limited), and he sent down his proxy for that purpose. He did not think they would do anything at all improper in passing such a resolution.

Mr. THOMPSON said they had had their account overdrawn several times, and he would like to know what security the bank had.

The CHAIRMAN said when they erected their stamps, and were laying out a large sum of money in the mine, they found it necessary to go to the Cornish Bank for assistance, and in every instance they had all the assistance they asked for without hesitation, and without asking for any security whatever, not even for a resolution of the shareholders authorising the overdraft.

Mr. THOMPSON supported the resolution, and said he held 182 shares. He had been exceedingly sorry to hear of the calamity to the Cornish Bank, but he had never heard anything against the character of Messrs. Tweedy. It was the general impression away from Cornwall that what they had done redounded to their honour and credit, and that they had done the right thing in stopping the bank when they did, rather than go on until a few would suffer for the many. The managers of the old bank would be the managers of the new, and Wheal Peevor should not be the first to cast a slur on the Messrs. Tweedy, and he thought they were bound in honour to give them a fair trial and a fair opportunity of making their way in the world, as they should like to have themselves if placed in a similar position. (Applause.)

The motion was carried with acclamation, and

Mr. TWEEDY returned thanks, and said the passing of the resolution so heartily and so unaninously could not but be most pleasing to his father, his brothers, and to himself. (Applause.) Of course, they had all seen the prospectus of the new company, and they knew that in future there were many other people who would share in the profits of the bank; but still they were very anxious, not only for their own bread and butter as managers, but for the sake of others, that the bank should prosper, and they should do all they could to make the bank a great success. (Applause.) Up to Saturday last there were upwards of 2500 shares out of the 5000 applied for, and they were allotted to, he believed, upwards of 250 shareholders, and a great many shares had been applied for since then, and he had no doubt when the bank was opened there would be a large number more applied for. (Applause.) Although the capital of the company was represented by 5000 shares, it was not intended by the provisional committee to allot the 5000 at once. They did not intend to go beyond about 3000 shares at present.

Mr. CHELLEW proposed that a hearty and unanimous vote of thanks be given to their purser, Mr. Pryor, Capts. White and Pryor for their energy in conducting the affairs of the mine.

Mr. WOOLCOCK seconded the motion, and said there was no doubt the mine had been conducted in the most economical and energetic manner possible.

The motion having been carried with acclamation, Mr. PRYOR acknowledged the compliment, and said they might rest satisfied that, as large shareholders in the concern, they were doing their utmost for the mine, and when they could return tin at 26*l.* 10s a ton he thought they were doing very well, and if tin rose any higher shortly they would reap all the benefit of it, and he hoped at the next meeting to be able to produce a better statement of accounts than he had that day.

Mr. THOMPSON said before Capt. White rose he would like to ask him what was the length driven since last April, the average value per fathom, and how much stuff was removed?

Capt. WHITE said the number of fathoms driven from April 13, to Feb. 18 was—in levels, 172 fms. 3 ft. 11 in.; in rises, 85 fms. 5 ft. 1 in.; in winzes, 12 fms. 11 in.; and in cross-cuts, 11 fms. 5 ft. 4 in.; being a total of 282 fms. 3 ft. 3 in., or something like ¼ mile in levels, rises, &c. This would prove to them not only what their stoping ground was, but that the stopes which were worked on tutwork were not nearly sufficient to take away the ground that was being laid open. They were not removing nearly one-half what they were opening up. At the last meeting there resources were estimated at 2000 fms. of ground, and since then they had added about 500 fms. more, so that they had something like 2500 fathoms of ground in reserve; and with respect to the value of those 172 fathoms driven in the levels, they would average somewhere about 20*l.* per fathom, according to the statements in the reports, and these reports had been borne out by the returns. At every setting he and Capt. Pryor valued the ground carefully, taking the ruling price of tin, and they generally allowed a little to be on the safe for themselves, which he thought was the proper thing to do, and seeing that they had raised their tin for 26*l.* 10s. a ton for the past 16 weeks he thought they were in a position which would bear a fair comparison with other mines.

The adventurers afterwards dined together, and after dinner,

The CHAIRMAN proposed "Success to Wheal Peevor." He thought they had every reason to be satisfied with the mine, seeing that they had a profit of about 7*l.* 10s. per ton on the tin raised, even at the ruling low prices. They had got rid of their difficulties, and had declared their fourth dividend in succession, and that declared that day was the largest, and carried forward a balance of nearly 500*l.* He hoped to increase that to 1000*l.*, and that would establish a good precedent for other mines in the county. He believed the only other mine in the county that did this was South Condurrow; and by adopting this principle they stood much better in the eyes of the public. Everything had been charged up to the end of February, which was as close as possible—(hear, hear)—so that the profit shown was a fair and legitimate one. He believed that was the only dividend-paying mine in the parish of Redruth, but he hoped soon to see a large extent of ground around them covered by other mining companies, and paying dividends also. They had called up 21,000*l.*, and they had great trouble in collecting these calls; but most of the original shareholders were still with them, and were now reaping the benefit of their patience and outlay. He hoped they would have a better price for tin and an increased dividend at the next meeting. (Applause.)

Capt. WHITE responded, and said he was highly pleased to meet them under such favourable circumstances. He had been connected with Wheal Peevor about three and a half years, and in that time he had seen a great deal of uphill work, but he was happy to say that those days were past and gone. There was a great difference between that meeting and the meetings which were held when they were putting up their new stamps, incurring heavy debts and making calls. Everything went on smoothly and comfortably now, but as in times of adversity they had done their best they would continue to do the same in times of prosperity. (Applause.) A stone had been brought to surface that day by one of the men from the bottom of the mine which would show them how productive the lode was. It was a splendid stone of tin, and it was just what he expected from what he had seen there on Friday last, as they were getting into a regular run of tin the same as in the levels above. They had a shoot down dipping east, which was about 25 fms. east of cross-course, and he had not the slightest doubt, judging from the nature of the levels driven above, they should have a continuous course of tin up to the 48 fm. level, and that it would maintain itself up to the boundary. He considered that the lode which had been intersected by the cross-cut about 6 fms. west of the engine-shaft was a most important point in the mine. In extending east from that cross cut behind the engine shaft they should be able to open up all their ground to the east of the shaft without any interference from any other quarter, and their south lode, which was clearly seen there, was the stronger of the two. Between the 70 and the 80 the south lode and the old north lode intersected each other, and the south lode being perpendicular carried the other with it, and it was from this that they were getting their tin at present.

"The health of Mr. Thompson" was proposed from the chair, and that gentleman, in acknowledging the compliment, said that whatever doubts had been entertained by outside shareholders in years gone by as to the management of the mine, there was no doubt now that the mine was fairly and properly worked; and instead of feeling as he did at one time that the money laid out in Wheal Peevor was lost, he had gladly doubled and trebled his former interest, as he thought he had got a permanent investment in the mine. Twelve months ago he was satisfied with the free and open manner in which all his questions were answered, and Mr. Rule's speech was the best report they could have had. He did not think they should have any extravagant anticipations as to the future price of tin, nor did he think it desirable for Cornishmen that it should go very high. He had written letters as to the necessity of working the mine economically, and getting every appliance for that purpose, and he believed that if managers generally set themselves to work in that direction, and all the costs were brought up so that the shareholders could see exactly how things were, that mining might still be beneficial to Cornishmen. (Applause). He believed that was done in Wheal Peevor, and he thought they would see better days than they had now. They would have still to lay out a considerable amount of money upon the mine, but he thought it would be all remunerative. There were parts of the mine which they had not seen which would in all probability prove as rich, if not richer, than that which they had seen, and he hoped the managers would think they had the perfect confidence of the shareholders, and would do their best for them, and in so doing they would do the best for themselves. (Applause).

Mr. CHELLEW proposed "The health of Mr. T. Pryor and Mr. F. W. Michell," to whom they owed the existence of the mine.

Mr. PRYOR, in responding, said they had been largely interested in the mine from the commencement, and they had not only stuck to their interest, but increased it, and they had now the benefit of receiving dividends instead of those who had parted with their shares.

Mr. MICHELL said when they started that mine he and Mr. Pryor agreed that there should never be any relinquished shares. Rather than allow anybody to relinquish their shares they would take them, and there never had been a relinquished share. Some were forfeited and sold, and a profit made out of them. When people got tired of their shares they said to them—"Give us a transfer, and we shall release you from all liability," and they took over 100 shares in that way, after warning people that they might ultimately regret it. They only did so because they felt convinced as to the ultimate value of the mine. These 100 shares were worth 1000*l.*, and they got them for nothing, only they had to pay 17s. 6d. a share call on them about a fortnight afterwards, and some calls after that. He recollected the time when they could buy 300 Peevor shares at 3s. 6d. a share. People did not believe in Peevor at that time, and were greatly prejudiced against the mine. They did not think the district was a good one, but he thought differently. It was true the price of tin had gone greatly against them. They commenced with tin at 85*l.* a ton, and it was now rather less. (Laughter.) If they could only have 60*l.* a ton he could hardly tell them the profit they could make, but every pound to the price of tin was a shilling to the dividend every four months. If they had not the price for tin, they had all the tin they could wish. Capt. White had told them they had 2500 fathoms of reserves, and that at 20*l.* a fathom meant 50,000*l.*, and he believed Captain White was considerably under the mark, as he always went on the safe side.

Mr. A. RICHARDS proposed "The neighbouring mines," and Capt. Bishop, of East Pool, responded. He had inspected the mine underground five weeks ago with Capt. Hosken, who had since purchased ten shares at a higher figure than the market price. There had been a good deal of prejudice against Wheal Peevor, and he had had a conversation with a gentleman about it who raised various objections to it, but when the cobwebs had been cleared away from his mind, he went and bought a number of shares. The district in which the mine was situated he believed to be a good one. It was not always necessary that they must be near a granite hill. There were exceptions, and Wheal Peevor was one of them, and the district was pregnant with mineral, and he thought they had a very good

property there, and it was worked in the most economical and careful manner, reflecting great credit on all connected with the management of the mine.

Mr. HEARD proposed the "Success of the tin trade," and said he believed the smelters were more disposed to give a good price for tin than some people were inclined to give them credit for. The Cornish smelters were identified with their interests, not only as smelters, but as mine owners, land owners, owners of dues, and as magistrates, and he could not help thinking that they did the best they could form them under the trying circumstances in which they were placed.

Mr. E. PEARCE responded, and said it was the wish and desire of the smelters to give the best price that the trade would afford, and often the standards had been put up to try and steady the market, when, very likely, they were hardly justified in doing so. There was a very large stock of tin staring them in the face, and until the demand surpassed the supply they could not expect much advance in the price.

Mr. HEARD responded to the toast of "The Press," and Mr. RULE, in responding to the toast of his health, said he wished now he had put his money in Wheal Peevor, instead of West Seton. He thought there was great credit due to Mr. Pryor and Mr. Michell for the manly way they stuck to Wheal Peevor, and he hoped the day would come when the adventurers would present them with a testimonial.

The "Health of the new Shareholders" was drunk, and Capt. PENTREATH, Mr. FARLEY, Mr. R. JOHN, and Mr. ODGER responded.

Mr. WOOLCOCK and Mr. JOHN MAYNE responded for "The Merchants." The latter stated that the reason why he had not become a shareholder in Wheal Peevor before was that he was afraid of the mine getting drowned with water in such a district.

Capt. WHITE was glad Mr. Mayne had mentioned about the water, as he knew there had been a good deal of talk about the water and as to the doubtful character of the district; but he could assure the adventurers generally that there was nothing whatever to fear on account of the water or as to the nature of the district. He had no doubt whatever if they had been at the base of Carn Brea Hill Peevor shares at that moment would have been worth 30*l*. per share, and they were as well worth that money where the mine at present stood as if it had been under Carn Brea. That the shares were down to the present low price was due to the tittle tattle of of people who talked about the water and the district in a manner which showed that they really knew very little of either the one or the other. They might rest assured that in Wheal Peevor they had a first-class property. In stoping their ground in the back of the 60 fm. level between the 48 and the 60, they communicated with old Wheal Peevor, which drained all the water from that point, and consequently they had nothing to fear, as people supposed with respect to the water from the east; and the great county crosscourse, which was now a distance of 100 fms. to the east of the present workings, was 10 fms. wide, and was the boundary line of all setts granted in the district, and could not be penetrated under any circumstances whatever. Many mine managers of other mines had been under ground, and they could not make out why their mine was in fork when North Downs was full to the adit. Mr. Price, the mineralogist, had a plan of North Downs Mine, and between North Downs copper lode and the tin lode there was a distance of more than 100 fms., and the great county cross-course had an influence upon the tin lode. Ever since the mine started they had as much water as they would ever have from that quarter, and they might lay their heads upon their pillows with the satisfaction of knowing that the water was not a matter of the slightest danger.

Mr. MICHELL said he and Mr. Pryor were under a penalty of 2000*l*. each if they cut through the county cross-course; but it would not be their interest to do so, as it would let the water in upon them.

Mr. ALLEN, a miner in the mine and a shareholder, added that besides the county cross-course there was a piece of dead ground between the mine and it, and they could not get any water below the adit. He believed that before they got down 300 fms. they would come to the granite.—Some other toasts followed.

PRINCE PATRICK MINE.

The ordinary general meeting of shareholders was held at the offices of the company, Seel-street, Liverpool, on Thursday, March 6, Mr. THOMAS GERARD in the chair.

The notice convening the meeting having been read, and the minutes of the last general meeting confirmed, the secretary (Mr. THOMAS HUGHES) read the directors' report, as follows:—

The directors, in again presenting their report to the shareholders, are pleased to be in a position to congratulate them on the great improvement in the mine, which was duly notified in the quarterly reports. The shareholders would be aware that the discovery was made in October last, and it has enabled the board to raise and sell a large quantity of ore, and at the same time to leave reserves of great value untouched in the workings. It affords the directors great pleasure to state that the discovery continues to improve, and at present, taking the width of lode at 5 fms., it is worth fully 30 tons per fathom for the entire width of the lode. The directors are in daily expectation of hearing that the rich course of ore left at Hughes' shaft is again cut into by means of the 62 south. This would add considerably to the yield of ore, as the lode at the time it had to be abandoned, owing to the strong feed of water, was worth from 2 to 3 tons of ore per fathom. The report on the underground work at the mine up to the latest moment will be submitted to the meeting, and Capt. Vercoe will attend to explain the same, so that the directors do not consider it necessary to enter any further into detail on this head. It is a matter of great regret that the general decline in the price of lead ore has prevented the board from placing before the shareholders a more favourable balance-sheet. A much larger quantity of ore could have been sold if the price was better, and the balance of profit and loss would thereby have been considerably larger than it is, but as lead is selling, through the general depression of trade, at least 5*l*. per ton below the average of the last six years, the directors consider it wiser to leave the ore underground until an advance in the price sets in, and sell only as much as will cover expenses and leave profit sufficient to pay a dividend of 10 per cent. all round. The directors hope that this arrangement will meet with the approval of the shareholders, as there seems to be little doubt that an improvement in the lead market will take place shortly, and then it will be an easy matter to send in large quantities of ore for sale. The directors beg to convey their sincere thanks to those shareholders who responded to the call for fresh capital which was made in February, 1878, particularly those who were strangers to the company. It is very gratifying to be able to say that the statement made in the report then issued—"the directors are of opinion that not more than one-half of the proposed new capital will be required to put the mine into a dividend-paying state, and at the same time leave a good reserve at call if required," has been fully borne out. As the shareholders will be aware, a very little over one-third of the new capital had been expended before the rich course of ore was again discovered, by means of which the board have been enabled to not only pay all costs, but to leave a considerable profit on the working. The directors have declared a dividend on the preference shares at the rate of 10 per cent. per annum, made up to Jan. 31, 1879, calculated from the date of application payments, and payable on and after March 12 instant, and there is every reason to expect that a dividend can be paid to the ordinary shareholders in August next, even if lead does not improve in price. Two of the directors—Mr. John Walker, and Dr. J. R. Smith—retire at this meeting, in accordance with the Articles of Association.

The captain's report was read, as follows:—

I beg to hand you my report for the general meeting, and am pleased to do so under such favourable circumstances, and to be able to state as an accomplished fact that you are in possession of a rich and paying mine. You are aware that active operations were resumed at the mine about the middle of May, after the temporary lull consequent on your having to make arrangements for providing the new capital. Our first work was to entirely re-timber the engine-shaft from the surface to a depth of 30 fms.; this has been done in a substantial manner with pitch pine, and will now last for very many years without any further repairs, and the mine generally is in good order. The 20 fm. levels have been driven east and west of Rule's shaft a considerable distance, and sumps have been sunk in the sole of the level to prove the lode. From time to time good patches of ore have been met with, but no important discovery has been made. These points at present remain in abeyance pending an improvement in the lead market; when this occurs they will at once be resumed, and the prospects warrant the assumption that good bunches of ore will be found. The 50 has been driven south of Rule's shaft about 15 fms. on the great south-west lode, and sumps have been sunk in the sole of the level. The lode has presented good indications for the whole distance, and is of immense size and strength, but no lead of value has yet been found. This point also is temporarily suspended, and for the same reason as the 20 fm. levels. I might here mention that this lode stands unwrought for a great length in this end of your mine, and ought to give you large returns of ore. Hughes' shaft has been sunk from the 50 as deep as the 62. The 62 has been driven south of Hughes' shaft on the new north and south lode about 15 fathoms. The object we had in view in sinking this shaft and driving the 62 was to get under a sump sunk below the 60, in which we left a good lode of ore rather more than a year ago, and where we got nearly all our returns during 1877, amounting to about 3000*l*. You will be pleased to hear that we have struck the same shoot of ore in the 62, and have within the last day or two broken therefrom solid lumps of lead from 1 to 2 cwts. each. I cannot yet set a value per fathom on this point, as it has not been opened on sufficiently, but I do not hesitate to say it is a good discovery, and quite comes up to what has been reported of it in former times. I expect on the day of the meeting to be able to give you more definite information respecting this discovery. I purpose fixing a lift of pumps in Hughes' shaft, and working them by attaching a rod to our engine. In my report for general meeting in 1878 (February) amongst other things I recommended a cross cut to be driven north in the 50, in search of the great south-west lode between Prince Patrick and Parry's Mine. I then stated I expected that in this piece of ground there were many thousands of pounds worth of lead. In October last we struck into the ore, and have driven on its course about 25 fathoms. We have cross-cut the lode to its full width in three different places with the following results:—In No. 1 cross-cut the lode is 15 feet wide, and produces 5 tons of lead per cubic fathom, or (say) 12 tons per fathom for the entire width. In No. 2 cross cut the lode is about 30 ft. wide, and produces 4 tons of lead per cubic fathom, or (say) 20 tons per fathom for the entire width. In No. 3 cross cut the lode is 27 ft. wide, and produces 7 tons per cubic fathom, or (say) 30 tons per fathom for the entire width. In the main level now being driven on the course of the lode there is a course of ore producing 6 tons per fathom, with rich lead standing on both sides. We have sunk three sumps to prove deeper sections of the flat, in each of which we opened on good ribs of lead, from 3 in. to 1 ft. wide. We are now sinking another sump, about 8 fathoms behind the end of the level, on what appears to be a north and south lode. We have passed through very good ore ground in sinking. In one end of the sump three is a rib 2 ft. wide, solid lead; this we shall further prove by driving on after we have sunk 3 or 4 fathoms deeper, and I fully expect to open out a rich section of lead ground. From the above valuations you will readily see we have a rich mine—in fact, it is one of the best discoveries made in Flintshire for many years. Since the beginning of November last we have sold 180 tons of lead ore, and have now on the surface fully 60 tons more, the principal part of which is ready for market. None of our reserves of ore have been exhausted; we have simply driven the levels and cross cut the lode. There is only one drawback in connection with the mine, and that is the wretchedly low price for lead; we are, however, doing all we can to meet this by economising in every possible way. I hope before long an advance to former prices will take place, when we can increase our output and make large profits. If the same prices could be got as were ruling two years since the mine would now be clearing over 6000*l*. per annum.—H. B. VERCOE, M.E.

The CHAIRMAN said that in moving the adoption of the balance sheet and reports he felt there was little for him to add, as they so clearly represented the present favourable state of the company. He begged to congratulate the shareholders on the improved prospects of the mine, which presented a great contrast to the state of affairs at the last general meeting. At that time nearly all the capital was expended, and the sales of ore were falling off, so that for want of funds they were reluctantly compelled to suspend operations, as the concern was getting into debt. The shareholders would be aware that, under those circumstances, the directors were authorised to issue 12,000 new shares at a discount of 4s. per share. Great difficulty was experienced in getting subscribers for this new capital, but after much uncertainty and anxiety the directors succeeded in allotting 8000 shares, which were all that were applied for, and on this number 6s. per share was paid, and fortunately it has proved sufficient for all purposes. The directors were in a position to commence sales much sooner than they expected, and at present they were selling 50 tons of ore per month. Notwithstanding the present very low prices of lead, they hoped to be in a position to pay a uniform dividend of at least 10 per cent. on all the shares for the current year. The preference dividend already declared on the new issue of shares would not amount to more than 190*l*. He could assure the shareholders that, notwithstanding their good fortune, every attention was being given to keeping the working expenses as low as possible, and he might safely say that they were now fully 20 per cent. less than heretofore. However, he did not think it prudent to say too much about the success of the mine, as it was better to have practical proof; and for a first report since the new capital was subscribed, he considered there was ample grounds for general satisfaction. He could only say that Mr. Hughes would be glad to explain any questions respecting the accounts, and Capt. Vercoe would be much gratified to explain the workings, &c., at the mine. He would now beg to move that the accounts and reports be received and adopted.

Mr. ORFORD asked for an explanation of one or two items in the balance-sheet.

Mr. HUGHES, after giving a satisfactory explanation of the items in question, said that the board were very particular in showing every item in detail in the expense account. As regarded the amount set down to sundry creditors, the shareholders had before them a detailed account showing the particulars. It was considered unnecessary to have the list printed in the balance sheet, as it comprised a number of small accounts, the greater portion of which were now paid.

Mr. IRVINE said he felt sure the shareholders present were satisfied with the explanations just given, and he had much pleasure in seconding the proposition of the Chairman.

The proposition was then put to the vote and carried.

The CHAIRMAN said that as Capt. Vercoe was present the shareholders would, no doubt, like to hear his opinion of the prospects of the mine. If any of them wished to have an explanation of any point in the report he could now get full information.

Capt. VERCOE, in reply to questions from several of the shareholders respecting the reserves of ore, future prospects, &c., said it afforded him great pleasure to state that he believed the company would have as good a dividend-paying mine as any in England. The great body of ore was so rich that it could be worked at a low cost; in fact, the ore when ready for market barely cost 40s. per ton, including all expenses. As to the course of ore now laid open, he never saw anything like it before, and he was glad to say it was improving in width and depth. He was glad to tell them that the ore in Hughes's shaft, now cut into by means of the 62 fm. level, was as rich as ever, and as soon as they were able to get a lift of pumps fixed from the 50 to the 62 to drain the ore ground he expected to get from that end alone from 20 to 30 tons of ore per month. They were at present selling only 50 tons per month, and that was more than he liked to send to market at the present low price, but if they were getting anything like former prices he could easily obtain from the new discovery alone double the quantity of lead ore they were now selling.

Mr. IRVINE asked if he could calculate the amount of the reserves?

Capt. VERCOE said that it was impossible to tell the value of the unexplored ground, but judging from appearances there were thousands of tons there. He could, however, answer for the reserves left in the ground they had gone through, and he thought he was under the mark in saying that their present reserves were worth 10,000*l*. He had a report from Capt. Francis, who inspected the mine for a shareholder on the 28th ult., which he would like to place before the meeting.

Capt. Francis's letter was read as follows:—

I have great pleasure in saying that I was much pleased with my inspection of the Prince Patrick Mine on Friday last, and with all that came under my notice. You have one of the richest deposits of ore I have ever seen in these measures, having proved it for a considerable length by one drift only through it, and proved for several yards in width, so that in its upper portion alone you have laid open very considerable reserves rich for the entire width, and in some places yielding fully 8 tons to the fathom; in addition to which you have rich runs below this proved in places for some yards in depth, and to be orey throughout. The end or forebreast of your driving is now very rich, and I am inclined to think a valuable east and west vein will ultimately be found in connection with this rich flat. As another point of special interest I may mention a new discovery at Hughes' shaft which you have just made in sinking on the north and south joint of the old flat, from which several fine lumps of ore have been taken out from ½ cwt. to over 1 cwt. each, which in all probability will lead to a deeper flat of ore running in the same direction as the old flat above. I am, therefore, glad to be able to say that I consider your success now firmly established, and the further development of your property likely to be of continuously increasing value.—WILLIAM FRANCIS.

Mr. HORNE said: I was underground last week, and can fully confirm every statement made by Capt. Vercoe. The richness of the lode mentioned in the report is a visible fact, and fully confirms the sanguine expectations of Mr. Hughes and the captain about the value of the mine. No. 2 and 3 cross-cuts, especially the latter, appear like alcoves hewn out of solid lead, so that the quantity of reserves in that level must be very great, and it is cheering to find the forebreast as rich as any portion already cut through. The main shaft is in a substantial condition, and should not again require any outlay, as it has lately been rebuilt to the 30 fm. level. Each year I have been to the mine there have been improvements on the surface, until the appliances for saving labour and preventing waste are now nearly perfect, or will be so when the jigger is worked from the engine, which will shortly be connected. The stores were neatly kept, and had not any signs of waste. This experiment is working successfully, and leaves a satisfactory profit to the company after giving the miners substantial advantages. In short, the mine shows a striking contrast to its condition a few years ago, and there does not appear to be anything wanting to enable it to return its capital except an advance in the price of lead.

The CHAIRMAN said it was very gratifying to hear such reports, and he felt sure that every credit was due to the managing director, Mr. Hughes, and to Captain Vercoe, for the present fortunate position of the company.

Mr. ORFORD asked if it was proposed to issue the remaining 4000 shares?

Mr. HUGHES said they would not be issued except at a premium of 40s. per share; but, so far as he could see, they were not likely to be issued, for reasons which he thought the shareholders should be glad of. In the first place, the 8000 shares issued left a sum of 4000*l*. at call if required; and, secondly, after paying all debts there was a clear profit of 344*l*., independeunly of the ore sold since Dec. 31, and the ore at surface, valued at 1200*l*. They had as fine a course of ore as any in Flintshire, and it would be absurd to think of issuing the remaining shares. He felt sure that those gentlemen who did not take up any of the preference shares when they had the chance of doing so must, at any rate, feel grateful to the few subscribers who came forward and provided the capitvl, by means of which all have been benefited. Of course, the preference shareholders had good reason to be satisfied, as they got 10 per cent. on the 4s. discount, as well as on the 6s. paid per share; but when they subscribed for the shares they did not know but that they would have had to pay up the full 16s. per share before getting any return. The shareholders would be aware that when the preference and the original shares each got 10 per cent. all the profits remaining over and above would be equally divided. He was happy to inform them that the prospect of an advance in the price of ore was all but certain. There had been a great improvement in the price of lead in America, and pig-lead was now selling there at 23*l*. per ton, so there was no fear at present of the American lead coming into the English market. There was now an improvement in the home market of 15s. per ton, and he hoped that at their next sale at Holywell—on the 13th inst—they would get a good advance on the last price. However, he was glad to be able to state that even if the sales should average only 10*l*. per ton the original shareholders would get 10 per cent. dividend this year, and if the price of ore advanced by 2*l*. or 3*l*. per ton, as it was early expected to do, the shareholders might count on receiving dividends, as heretofore, of 25 per cent.

The meeting then proceeded to the re-election of the retiring member—Mr. John Walker—proposed by Mr. HUGHES, and seconded by Major R. B. CUMMINS, and carried. Mr. John S. Blease was re elected auditor for the ensuing year.

A vote of thanks to the Chairman terminated the proceedings.

ELECTRIC TELEGRAPHS.—The object of the first part of the invention of Mr. J. W. BROWN, of Leadenhall-street, is to provide apparatus for recording the motions of an armature or coil freely suspended between the poles of a permanent or electro-magnet, or permanent or electro-magnets, when the motions of such armature or coil are caused by electric currents passing through a cable or difficult circuit. In carrying this part of the invention into practice he provides the freely suspended armature or coil with a contact maker and breaker, which acts against a freely suspended or moving contact receiver in such manner that little or no resistance is opposed to the motions of the armature or coil. The contact maker and breaker attached or secured to the armature or coil, as mentioned, may itself be so constructed as to offer little or no resistance to the motion of the said armature or coil when contact is made with the receiver. The said contact maker and the contact receiver are connected to a local battery, whereby any desired record may be obtained of the motions of the armature or coil by any usual or suitable apparatus. Under one modification the contact receiver is freely suspended axially above the armature or coil, and contact is made and broken by means of a contact piece fixed or secured to the armature or coil. Under a second modification the receiver is suspended in front of the armature or coil, and is free to move to and fro, being maintained in position by a vane or like appliance surrounded by fluid. The contact maker consists of an arm attached or secured to the armature or coil. Under a third modification the contact maker consists of an arm attached to the armature or coil, and provided or fitted at its outer end with a tube partly filled with fluid, or containing a ball free to roll about therein. The receiver consists of a fixed point or stud, or fixed points or studs, at one or both ends of the tube or container. Contact is made or broken by the fluid or ball touching or coming in contact with the receiver during the motion of the tube or container. It will be obvious that under the invention many modifications of apparatus may be made in which contact is made and broken without affecting the motion of the armature or coil.

EXPANSIVE HYDRAULIC ENGINES.

The idea of working hydraulic engines expansively is one which would, owing to the well known nature of water, be most unlikely to occur to engineers in this country; yet Mr. P. MAYER, of Vienna, seeks to obtain the advantages of expansion by employing a cut-off. He states that the object of the invention is to enable hydraulic engines to work efficiently when the water pressure supply is cut off at any part of the stroke for the purpose of varying the power of the engine, as may be required, the pressure being continued in the cylinder even after the cut-off, and gradually decreasing towards the end of the stroke, so that hydraulic engines operating in this manner will work in a similar manner to and with the same advantages as expanding steam engines. For this purpose the valve for regulating the admission and escape of the water to and from the working cylinder, which may be of any suitable known construction, is provided with valve gear of known arrangement for causing the valve to cut off the water supply at any desired point of the stroke, and at each end of the cylinder, or at the one end only if the engine is single acting, is provided an air vessel or chamber, which at the commencement of the stroke contains air at the same pressure as that of the water column working the engine; thus, when the water pressure supply is cut off at any part of the stroke, the air in the air vessel in expanding will enter the cylinder, causing the piston to complete its stroke with a gradually decreasing pressure, and consequently without shock, such as is experienced with ordinary water pressure engines.

As the air in the air vessel may become absorbed by the water to a certain extent during the working, any such loss is made good by providing on the air vessel an inlet valve or cock communicating with the outer atmosphere or with another reservoir for compressed air, which is opened either automatically or by hand when the air in the air vessel has become absorbed to any appreciable extent, such valve being also brought into action when the degree of cut off is varied during the working of the engine. Such varying of the cut-off may be effected either by hand or by any suitable known contrivance, such as is used for this purpose in steam-engines, or the admission valve may be connected directly with a governor by gearing of well known construction, whereby the cut-off is varied by the action of the governor when the engine is running above or below the normal speed. By applying any arrangement of the well known "link motion," not only can the cut-off be varied but the motion of the engine can be reversed.

CURIOUS WATER ELEVATOR AND AIR COMPRESSOR.

It not unfrequently happens that a machine although not attractive for general adoption possesses great recommendations for particular applications, and the new water elevator and air compressor recently patented in America by Mr. JOHN PATTEN, of San Francisco, and described in the Mining and Scientific Press, appears to be one of this class; it would probably be of great utility and very economic where a mine is so situated that a mountain stream could be availed of to produce the requisite amount of compression. The air is compressed by means of a descending column of water; the water is raised by the action of the air thus compressed. This is by no means a perpetual motion machine, although its working is quite peculiar. The apparatus is divided into sections of two different kinds, one for compressing air and the other for raising water. Several sections of both kinds can be connected together in a series of short independent compressors and lifts, and put in the form of a siphon, in which case the water will be raised to any desired height by discharging it a little lower than where it is first taken from, and employing more compression than lifting sections. In this case no water will be used but what is being raised by the apparatus. In localities where there is access of surface water, that can be used in connection with the water that is being raised, the outlet will not have to be below the level of the inlet. The variation will depend on the amount of water used, and how far it descends while being used in the apparatus.

The air compressor consists of two chambers setting side by side, which fill and empty with air and water alternately. They are connected with supply and discharge water pipes at the bottom, and atmospheric air and receiving air pipes at the top. There is a float in each chamber that regulates a set of automatic valves, situated at the bottom of the chambers, which allow one chamber to fill while the other is emptying, and as soon as one gets full and the other empty they instantly reverse, causing the full one to empty and the empty one to fill, and *vice versa*. At the top of the chambers is a set of ingress and egress valves (check valves). While one chamber is emptying an ingress valve opens, which allows the chamber to fill with atmospheric air. When the action is reversed, and the chamber begins to fill with water, the ingress valves closes and allows no air to escape into the atmosphere. When the air is compressed up to a pressure equal to the height of the column of water that is filling the chamber an egress valve opens, which connects the receiving air-pipe with the chamber, and as the water fills the chamber the air is displaced and forced into the air-pipe, in which it is conveyed to the elevating sections. The elevating section consists of two chambers, setting side by side, connected with supply and discharge water pipes at the bottom, and supplying air-pipe and the atmosphere at the top. There is a set of valves on top of the chambers, which alternately change the compressed air from one chamber to the other; while one chamber is connected with the atmosphere, the other is connected with the compressed air, and *vice versa*. There is a set of ingress and egress valves at the bottom of the chambers, the former connecting with the supply pipe and the latter with the discharge pipe. It will of course be understood that it is not professed to create any power, but merely to utilise power which would otherwise go to waste. This is really what is done by the hydraulic ram, and in the various cases to which that machine is applicable the results have been highly satisfactory. With regard to Mr. Patten's invention, it is considered that it has an equally large field of usefulness before it, and that it will be largely applied where the conditions are suitable.

PICKLING AND WASHING METAL PLATES.—According to the invention of Mr. J. P. JENKINS, of Llansamlet, Glamorganshire, he provides a rectangular double frame made of gun metal or other suitable material, with pockets of various sizes suitable for reception of iron, steel, ar other metal plates; he suspends this frame containing the plates to the jib of a hydraulic crane by which the frame and plates are lowered into a copper or lead tank, provided with the necessary quantity of acid as is well known. Vertical motion is imparted to the frame by means of suitable cams placed underneath, the cams being placed in such a position that one portion of the double frame ascends and the other portion descends simultaneously after the plates placed in the frame have been sufficiently subjected to the action of acid upon their surface in the acid bath, the hydraulic crane subsequently lifts the frames, and places them in a bath of water where he again causes the frames to ascend and descend by means of suitable cams, until any excess of acid which might remain on the plates after the removal of the frames from the acid bath is removed. His arrangements provide for the use in combination of an acid bath, and a water bath, and three double frames, the practical operation being that the frames first loaded with plates are lifted by hydraulic motion into the acid bath, and after being there dipped a sufficient number of times to give the necessary action of acid on the plates, are continued on by hydraulic motion to the water bath, where the frames are again made to ascend and descend by the action of cams, and the frames are again lifted by hydraulic motion and moved away to a place where they are discharged, so that in ordinary use whilst one double frame is being loaded or unloaded, another frame is being dipped in the acid bath, and another in the water bath. The invention is also applicable to the treatment of the surfaces of various other metallic articles, such as cast or wrought iron, previous to being subjected to what is known as the galvanising process.

FIELD ASSAYING—THE LITTLE WONDER.

Chemists and assayers who are accuatomed to carry on their profession in or within easy reach of great cities have no conception of the extent to which their harder working brethren, who earn their livelihood in the vicinity of mines in unsettled or partly settled countries, have to exert their ingenuity to devise offhand substitutes for costly reagents, conveniently arranged laboratories, and delicate balances which the city analyst regards as absolutely indispensable. The wants of the travelling analyst, who is compelled to carry his laboratory and professional plant in his carpet-bag or great coat pocket, are not, however, always ignored, but most of the useful inventions of this class come from the districts in which they are most needed. Some few years since we noticed the "Wee Pet"—which might be called a pocket assayer's furnace, with all the necessary plant of an assayer's laboratory, except a chemical balance; and the ingenious inventor, Mr. J. S. Phillips, of San Francisco, has now supplied that important omission by bringing into the market a miniature assayer's balance, to which he has given the name of the Little Wonder. It is a combination of weighing scales, balances, weights, forceps, calculating tables, or scales, by which the inventor provides a simple and ready apparatus, with which the prospector can accurately determine the cash value per ton in gold and silver, as well as the fineness and percentage. The stand or case is made of metal, and has an open top and ends. Across the center is an upright gripping piece, in which is an inverted knife edge, on which the beam is balanced. This metal beam has at one end, and forming a permanent part of it, a conical platinum cup, and at the other end a small knife-edged crook, on which may be hooked a little pan. To balance this aluminum pan when attached to the crook by a hook and silk cord a balance-clasp is put on the beam. When balanced by the clasp the pan can be used for weighing the sample bullion and buttons in the usual manner.

On the back of the case are two lugs, which hold the beam in position when it is not in use. The knife-edge, on which the beam rests, extends to the back of the case; and by sliding the gear back and slightly springing the ends under the lugs, it is firmly held in place. The gudgeon piece or inverted knife action is shown in the centre of the beam. The weights for use on this beam are made in the form of riders, and are kept in the weight case, which has a cover, to keep them in place. On the beam is fitted a permanent adjunctory, or regulating paper disk weight, which may be slid back or forth. The riders or weights are of different colours, for easier discrimination. On the inside of the case, under the beam, is placed a scale, marked or printed on paper with properly marked cross-lines, which in combination with the different coloured and weighted riders will give the value in gold or silver bullion in dollars and cents, without the necessity of figures or any calculation whatever on the part of the operator, who is not even required to read figures, as none are used. The front part of the stand is turned over to form a circular hollow side, inside of which is placed the large bar weight, used as a balance for samples of ore. The heavy beam is made semi-tubular at its centre, and on its closed side is made a diamond-shaped slot, by which the beam is kept in proper position on the knife top when in use. Two large pans, are used with this beam and are suspended from its ends by hooks and silk cords. This beam is used for weighing samples of auriferous quartz and large silver assays. These pans have only two sides, which when not in use fit under the stand or case, the sides projecting upward so as to encircle said case. The three weights used with these pans are made of different sizes and colours. They are made of wire rod bent into S C shape, indicating that they are self-calculating weights. They are used for weighing the samples to be assayed, the resultant button being weighed on the other beam by the other weights as described.

The arrangement is extremely portable, the beams, weights, pans, pliers, all fitting together so as to be slipped in a small box and put in the pocket. It affords a portable, convenient self-calculator, and exceedingly delicate weigher of minute buttons, and such assays may be made with very great accuracy. But it may also be used for furnace assay buttons either by its self-calculation or the scale, or for those who may prefer it, by attaching the pan, and weighing by any decimated weights in the pan itself, which may still be read under the self-calculating mode or by any more ordinary manner.

AIR AND GAS ENGINES—AIR COMPRESSSORS.

It might be some consolation to holders of gas shares who fear that their interests will be prejudiced by the adoption of electric illumination to learn that they themselves possess as good a field for enterprise in displacing steam-engines by gas-engines as is possessed by those who seek to replace gas by electricity. As to the direction in which there is the greatest chance of success it will be best for those concerned to consult the volume of Abridgments of Specifications relating to air, gas, and other motive-power engines, as by that means they will oe able to determine, from considering what has been attempted, the probable causes of failure of the impracticable machines, and the advantages of those which have proved successful. All varieties of motive-power engines except steam-engines, hydraulic engines, and motors and electric or magnetic engines are included, and the volume being a Government publication is issued at cost price—about 2s. 4d. with postage for nearly 500 pages—thus leaving no excuse for its contents remaining unknown to those interested.

The principles of the several gas-engines which have from time to time been proposed differs widely, thus there are 36 inventions according to which the gas acts explosively direct on the piston, 5 in which the explosion acts in rotary or reaction engines, 7 are explosive acting on water, 4 are explosive with condensers, 5 explode inflammable vapour, 5 are worked by compression of air, 15 by the production of a vacuum, 15 by the expansion of heated gases, and 10 use gas and steam combined. The heated-air engines are very numerous, and widely different principles have been tried. Almost as many attempts to obtain perpetual motion are made now as in former times, so it would appear that education and progress have done little to teach inventors the absurdity involved, and it is regrettable to observe the uames of many who have acquired celebrity in other branches of science recorded in the list of patentees of this class of invention as permanent evidence of the intervals of temporary insanity to which they have been subjected.

But, perhaps, the most attractive series of inventions referred to in the present volume, to which attention is just now being directed, is that bearing upon the compression of air for motive purposes, since it is upon the perfection of machines of this class that the success or failure of the various rock-drills in a great measure depends. The pump appears to have been the earliest contrivance adopted for this purpose. George Medhurst having used it in 1800 for compressing the air to propel his aeolian engine; but the first effort having any prospect of success was that of James Surrey, who in 1836 proposed the use of compressed air in lieu of steam for the purpose of working engines hitherto worked by steam. The invention has no connection with rock-drills, but is interesting as being the first effort to store and use compressed air. Referring to its application for locomotive purposes he points out that several small reservoirs are better than one large vessel, as when one reservoir has been partially used it may be reserved for descents and places where little power is required, while for ascents and at first starting a new reservoir may be opened. A pressure of 400 lbs. to the square inch is, he says, sufficient for all practical purposes. The application of wind power to the compression of air was proposed by J. R. Atha in 1845, whose invention "consists of four or more sails fixed on a stationed supporter, which sails are made to revolve by the pressure of the wind. To the fulcrum, or shaft of the sails, are attached two force pumps." The air is forced by these into a main receiver, from which a minor receiver is charged. The condensed air in the latter was made to act in cylinders instead of steam.

It appears that 10 inventors have sought to compress the air by heat, 6 by momentum, 18 by pumps, 11 by steam, 14 by water, 3 by weight, and 2 by wind. At present steam power and compression by means of pistons are most in favour, but under exceptional circumstances, as at the St. Gothard's Tunnel, where powerful Alpine torrents are available, the utilisation of water-power has reduced the cost of compression to an almost nominal amount, and it is not improbable that in connection with industrial mining many cases might be found where the utilisation of wind power for the compression of air would, by permitting rock drills to be introduced, add largely to the profits of the miners. The volume is well worth reading, if for no other purpose than to gain hints which may be applied to increase economy.

GAS CARBURATION.—During the past quarter of a century the inventions for carburetting gas have been almost innumerable, but, although the improvement of the light has been beyond question, the difficulties and inconveniences attending the processes have been so great as to lead to their speedy abandonment. The illuminating gas as supplied by the companies is always capable of higher carburation, because practically the companies are compelled to maintain a certain percentage of hydrogen to make the gas carry, and even with the greatest care the gas in passing through the mains becomes impoverished (for the less carbon contained, the less light) by the depositing by condensation of the napthaline. The remedy not unnaturally proposed has been to restore the carbon to the gas at the place of consumption either by recharging with the napthaline or by using some other carburator. The inventions for effecting this have been innumerable, but not one has proved of permanent practical utility, owing to insuperable difficulties. The inventions may be ranged broadly into two classes—those where the carburator is introduced at the burner, and those where it is introduced where the service enters the premises. The insuperable difficulties are these—When the carburetting is effected at the burner the distance from the flame of the vessel containing the enriching material must be varied to suit change of temperature, a comparatively small increase of heat so far over-enriching the gas that the flame gives off dense volumes of smoke; and secondly, when the carburetting is effected at the service very little change of temperature, even of the atmosphere, causes the napthaline or its equivalent to condense in the pipes, and by choking them diminish instead of increasing the light. Another difficulty is that whether napthaline or any other carburator be used, the lighter constituents are first taken up by the gas, and the heavier cannot be taken up under the same conditions—that is, a temperature which suits the lighter will not take up the heavier, and a temperature which suits the heavier will take up the lighter too quickly. All the inventions work well for a short time, but none are reliable. Mr. Kidd, who has patented many inventions of this class, is now, in conjunction with Mr. Livesey, introducing another arrangement through the Albo Carbon Light Company, of Westminster, and it is at present being tested at the Aquarium. Attached to the cluster of burners is a brass cylinder, beneath which a small gas jet is lighted; this is merely a temporary arrangement. The cylinder contains the solid napthaline, which the gas jet is employed to turn into vapour, and the combination of that vapour with the ordinary gas—or, in other words, the reinforcement of the gas with the carbon of the napthaline—produces the vivid white light which everyone must admire. There are now in the eastern section of the building 200 burners, in the place of upwards of 500, the amount of light afforded being greater than was given by the larger number. A recent comparison is stated to have given this result—that under the ordinary mode of lighting 1502 ft. of gas would have been consumed, while with the Albo-Carbon process the consumption was 600 ft., the amount of light in the latter case being such as would have required 3000 ft. of common gas to be burned. It will be seen from this that a large reduction in the quantity of gas consumed, and, therefore, in the amount of gas consumers' bills, is claimed as one of the important features of the invention.

TRANSMITTING POWER BY SHAFTING.—In order to transmit the motion and power of a shaft, fitted in bearings, to one or more shafts occupying any desired and changeable position Mr. WILHELM RITTER, of Altona, Germany, proposes over one of the ends of a motive power shaft to place a box of a right angle shaped bracket, and a conical wheel fastened to the outer end of this shaft. The other angle of the bracket is likewise formed as a box, the outer part of the boring being enlarged for the reception of a cylindrical prolongation of a similar bracket, and is furnished with a set screw to secure the second bracket, which can be turned within the enlarged boring of the first one in any desired position of a circle. A short axle passes through the box of the second bracket, the corresponding projection and the box of the first bracket, and each end of this short axle is furnished with a conical wheel fastened to it, and one of these wheals is in gear with the before-described wheel of the motive-power shaft, while the other conical wheel is in gear with a similar wheel fastened to the end of a shaft that revolves in the boring of the other box of the second right angle bracket By means of this gearing the shaft of the second bracket is put in motion, and the axis of this shaft can be turned into any position within the plane of a circle, after loosening the before-mentioned set screw, and turning the second bracket in the boring of the first one. After having brought the shaft of the second bracket in the desired direction, the position of the two brackets to each other is secured by means of the set screw. By means of two further pair of conical wheels, two more angle brackets of similar construction and connection, and another short axle, the transmission can be continued upon a third shaft, and the movableness of this third shaft will be greatly increased. The transmission of motion and power can in such manner be continued as far as necessary to other shafts, and the end of the last shaft may be constructed for the reception of a tool, or a pulley may be placed upon this shaft for driving a tool or implement. The conical wheels can be furnished with protecting covers.

CRYSTAL DECORATION OF TIN-PLATES.—An improvement upon his invention of January, 1878, has been patented by Mr. L. Q. BRIN, of the Borough, Southwark, according to which he takes the metal with the surface crystalised in any known manner, and artificially produced or otherwise; thus, for instance, a lead surface simply exposed to the oxidising action of the air will, when microscopically examined, exhibit a crystal-like surface, although to the naked eye only a dull even surface. He produces a slightly crystal surface by pickling, and then writes, prints, draws, or otherwise marks or decorates such crystalised or crystal-like surface by means of a brush, type, stencil, engraved stone, moulded india-rubber, "decalcomanie," or other convenient means with a drying oil or varnish of any kind, or grease, or resinous fat, or other transparent or opaque medium capable of resisting the action of the baths hereinafter mentioned. Thus printed or marked, the plates are submitted to the action of an acid bath, which will vary according to the nature of the metals. As soon as the desired effect is obtained by immersion in the bath, the plates are transferred to another bath, and there well washed in pure water and subsequently dried. Surfaces treated as above described present the strongly marked and decorative appearance of the surfaces produced by the process described in the specification of his previous patent, except where the surface has been protected by the varnish, in which place the surface is uniformly bright. But as regards lead surfaces, the parts exposed to the acid will present a dark dull appearance, while the parts protected by the varnish will have a uniformly bright appearance, as in the other cases.

IMPROVED STEAM BOILERS.—The main object of the invention of Mr. P. O'CONNOR, of Wavertree, Lancashire, is so to construct a boiler that the heat given off by the burning fuel shall be fully utilised, whether such boiler is used with a slow or fast burning fire. The said boiler shall also be capable of being placed in any required position, and may if desired be used without being set in brickwork. The invention relates chiefly to saddle or cylindrical boilers, in which the heated gases and products of combustion are led downwards from the fire-place beneath the bottom of the said boiler, and finally in a zigzag course up the sides of the boiler, and consists in making the heated gases strike against a hollow water back, to which they give out heat, whilst descending to the bottom of the boiler; in making hollow water sides extending to below the bottom of the boiler, to form the sides of the flue, through which the heated gases pass beneath the boiler; and in constructing water ways or wings along the sides, so as to cause the heated gases to travel in a zigzag path up and along the sides of the boiler. Boilers thus constructed are calculated to provide a greater water surface to be acted upon by the heated gases and products of combustion than is ordinarily the case, and they may with advantage be employed to replace boilers of the ordinary construction, and are suitable for fixing in any desired position.

THE WILD DUCK, OR SPORTSMAN'S ARMS.

"Now we are all met once more, I want to know, men," says old Tom, "what's your opinion about the run direction of lodes; must run in only one direction to make a rich bal." "It's my opinion," says Uncle Henny," and I 'spose I'm the oldest miner in our mitten, that a don't matter a straw which way a lode do run ef a in the right sort of ground, and got somethen to live upon. You never see'd a man get fat 'pon barley hoggans, nor did ee ever see a rich lode in a barren country. For a lode, like a man, must have somethen to feed it; and so long as the country is good and full of feeders, droppers, cross-branches, cross-courses, flookans, caunters, and all the there things, a lode may run east, west, north, or south, for in different districts you will find rich lodes in all directions; and 'tes my opinion, too, that where a lode in any district is only rich in one direction, it es not owing to the direction but to the country that feed the lode and supply the riches." "I agree with ee, Uncle Henny," says old Tom. "And so we do every man of us" says Jan Temby, "for a man might jest as well say that tin was confined to granite, copper to killas, and silver-lead to limestone, as that a lode would only be rich in one direction. Now, we know very well that we find tin in killas and also copper, and in some districts rich silver-lead in granite, and copper in limestone. Nobody can contradict this, but can the most learned men living tell how in one district there is silver-lead in granite, in another place tin, in another copper? In another district how is it that there is tin copper, and silver-lead in killas? Now, if the learned men cannot tell how this is so, they don't know more than we do, for we know 'tes there, but how it got there we don't know, nor nobody else I reckon. What would people say if we went costeening for silver-lead lodes in Carn Brea hill or Carn Eutral; for if silver-lead is found in granite in one district, why not find it in granite in every district? This may be a foolish question, but I reckon 'twill take a wiser man than is in this mittin to answer." "Iss!" says Jemmy Dowa, "or in all the mittins of all the institutions." "You don't know," says old Tom, "some of the 'science classes' may tell ee all about it before you know where you are." "I wonder," says Jan Jewill, "if the price of tin and copper will ever get up again?" "Everybody," says Uncle Henny, "seem to think it will, but nobody can tell when, and it seems to me that one man's opinion is as good as another, and not worth a straw. A good many people say that the lords in such bad times ought to give up the dues, but I don't think so. The adventurers when the take up a mine make an agreement for a lease, and settle the dues. If the don't make a fair agreement 'tes their own faut. A bal that don't make returns don't pay dues; but when a bal has paid tens of thousands profit to the adventurers and then get poor. I don't think 'tes fair to ax the lord to give up the dues. Everyone has had his share of the profits, and the full benefit of their agreement. If the lords while we have such bad times and low prices for tin and copper would allow their dues to be applied to drive a deep cross-cut to cut a known side lode, or sink the main shaft 20 fms. or 30 fms. deeper, there would be reason in so doing, and a prospect of benefitting all concerned. I don't see any good to come from giving up the dues; but if the are applied as I said, we working miners would have employment now, and the lords and adventurers reap the benefit hereafter." "I should be fine an glad," says Jan Temby, "if the lords would take your advice, Uncle Henny. What do you think of it landlord?"

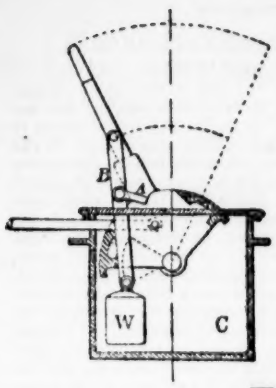
"I think," says Cousin Will, "if the matter was properly laid before the lords by men of influence that a better plan than Uncle Henny's could not be introduced for the relief of the present distress, and the remedy could be applied at once—not as charity, but as a sound investment of capital. In future it would probably be a good plan in granting new leases if the lords fixed the dues at 1-15th on *bona fide* profits, or 1-30th on the marketable produce. Surface damages to land, crops, and houses could be easily settled by arbitration. We hear a good deal sometimes about what some gentlemen are doing in giving employment to miners to hack up old commons and waste ground. I don't believe in such charitable proceedings. Besides, old miners exposed to bitter cold weather in doing such work die like 'winnerds' and 'vilfares' in frost and snow, and where is the great charity in a gentleman expending money to improve his own property. It is a very safe speculation to employ distressed miners to improve waste land so as to yield 3½ per cent. upon the outlay, and probably in a few years 7 per cent. for ever from what was previously of no value. In fact, it is no more charity to employ miners to improve waste ground or commons than it is charity to employ navvies to make a railway, for neither the one nor the other could be made without the workmen, and the workman is worthy of his hire wherever he may be. He is a sensible man, leaving charity out of the question, who improves his own property." "No doubt about it, Landlord," says Jan Temby, "and in my opinion it will be very hard for any man to contradict what you have just said. Now you're here we should like to hear your opinion about the new fashen of mines paying dividends, and thousands of pounds in debt?" "There can be but one opinion," says Cousin Will, "and in former times the purser and manager of a mine would so soon think of trying to fly over Carn Brea hill as pay a dividend and the mine in debt. People may say what they like, but in my opinion we shall not have honest mining again until the accounts are held every two months, with every account charged, the cost-book showing every debt and liability, also the amount of ore sold up to that date, and an honest balance struck; if there is profit, divide it, and if there is debt make a call, and pay it, but to be paying dividends, and the mine thousands of pounds in debt (if things are called by their right names) is dishonest. Then again there is the sham plan of accounts lately introduced of 'counting the chickens before they are hatched'—in other words, giving credit for ore that was never sold. This is actually done in cost-book mines. The fact is the adventurers are equally so much to blame as the purser and manager or committee. They are all in one boat, and deceive the public with the name of dividends when they are actually borrowing money and paying interest for it.

"I tell ee what it es," says Old Tom, "the 12-weeks accounts and four-weeks months must be knocked in the head, and the must come back again to the honest old plan of two months accounts, and paying dividends out of real profits, instead of out of borrowed money, and make calls to pay debts, or we shall never again have good times for prosperous mines." "But you forget Old Tom," says Jan Temby "that some of the bals so much in debt to the banks have thousands of pounds worth of tin in stock." "Very true Jan, but there is not one of them I reckon got tin enough to pay their debts, and tin in stock is not cash in hand, and no mine is right, tin in stock or not, to pay a dividend with borrowed money. The new fashen of four-weeks months, 12-weeks accounts, borrowing money to pay dividends, and giving credit for ore that was never sold have upset the old cost-book plan altogether, and the that brought in this new fashen have done a purty lot of mischief to honest mining, and the sooner the come back to the honest plans and customs of our fore-fathers the better, for the new fashen mining is like the long tails of ladies dresses, dragging the people through the mud."—*From Cousin Jack's unpublished M.S.*

EPPS'S COCOA.—GRATEFUL AND COMFORTING.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Epps has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—*Civil Service Gazette.* Sold only in packets labelled—"JAMES EPPS and Co., Homœopathic chemists, London."

SWITCHES AND CROSSINGS,

FOR RAILWAYS AND TRAMWAYS, WITH PATENT LEVER BOXES.



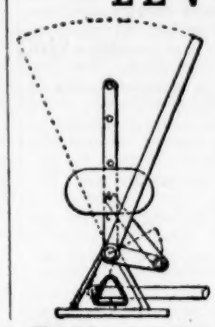
Hartley's Patent Lever Box,

REVERSIBLE UNDERGROUND,

Can be set to work either way; by turning over the catch at A and reversing the lever, the weight W swings over to C, the catch preventing its return until again turned over. The reversing is effected with very little power, as the weight is raised but a few inches in the operation.

HARTLEY'S PATENT

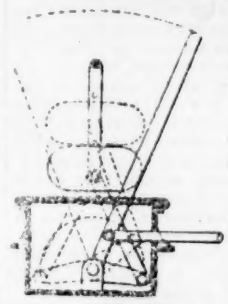
LEVER BOX.



Specially designed for Colliery Workings, or where economy of space is an object. Is reversible, and can be locked either way, or dead-locked, so as not to work at all.

Hartley's Patent Locking and Reversible Lever Boxes,

HALF UNDERGROUND,



Will set over both ways, can be locked so as to work on one side only, or the switches can be locked on either side, so as not to work at all. Takes up less room than any other, as the weight does not turn over; works equally well if full of water; can be supplied at the price of an ordinary lever box.

Tank Locomotives, Siding Stops, Wheels, Rails, Chairs, Spikes. Bolts,

AND EVERY DESCRIPTION OF PERMANENT WAY FITTINGS.

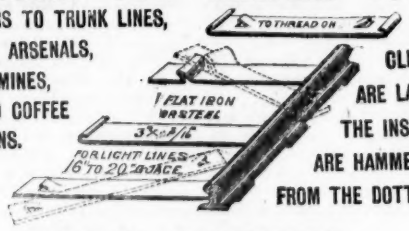
Iron and Steel Pit Cages, Wrought-iron Roofs, Headgears, Girders, Turntables, Patent Coal Tip, Boilers, Engines, Water Cranes.

HARTLEY and ARNOUX BROTHERS, Stoke-upon-Trent.

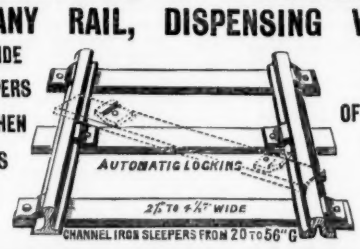
A NARROW GAUGE RAILWAY **—LECRAND'S PATENT—** COMPLETE IN TWO PARTS, From £250 per Mile.

WROUGHT IRON SLEEPERS TO FIT ANY RAIL, DISPENSING WITH SPIKES AND ALL LOOSE PIECES.

FOR FEEDERS TO TRUNK LINES, QUAYSIDES, ARSENALS, FORESTS, MINES, SUGAR AND COFFEE PLANTATIONS.



THE OUTSIDE CLIPPING SLEEPERS ARE LAID FIRST, THEN THE INSIDE SLEEPERS ARE HAMMERED UP AS FROM THE DOTTED LINES.



7 MILLIONS OF THESE SLEEPERS ARE IN USE IN ENGLAND, FRANCE, GERMANY, BELGIUM.

CHANNEL IRON SLEEPERS
FOR SINGLE HEADED RAIL WITH OUTSIDE BEARING
2⅛ TO 4½ WIDE
Do - Do - WITHOUT OUTSIDE BEARING
Do - Do - TO THREAD ON — NO KEY

FOR CONTRACTORS, FORTIFICATIONS, BRICKYARDS, EARTHWORKS, QUARRIES.

SOLE AGENTS, **SHAW BROTHERS,** BIRMINGHAM.

DRAWINGS & PARTICULARS ON APPLICATION. TO SAVE TIME, PLEASE GIVE GAUGE, WEIGHT OF RAIL AND KIND OF TRAFFIC.

REFINING PIG-IRON.

For the purpose of refining, pig-iron is, according to the process of Mr. T. S. Blair, of Pittsburg, treated in a reverberatory furnace in a molten state. It may be melted in the furnace itself, or melted in a cupola, and run thence into the furnace, or it may be taken direct from the blast furnace. The hearth of the refining furnace is made of siliceous sand, such as is commonly employed for the open hearth steel-melting furnace, or it may be made of any other sufficiently refractory substance which will not impart oxygen to the metallic bath. The furnace may be of any known form, stationary or rotative. The refining is accomplished by means of oxide of iron introduced into the furnace before the pig-iron is charged, or thrown into the bath after the pig is melted. The action of the oxide of iron so introduced is to remove the silicon, sulphur, and phosphorus to a large extent before diminishing the carbon to any great degree, and the charge of oxide is so regulated that its action is exhausted before it has so far reduced the proportion of carbon as to cause the metal to become pasty. The metal thus refined is run off from the refining hearth, and either allowed to cool in forms convenient for subsequent use, or is conveyed in a molten state into other furnaces or receptacles for further treatment. If a single refining operation be insufficient to eliminate the silicon, sulphur, and phosphorus to the extent desired, the bath is prepared for a fresh charge of oxide by first infusing into it a new supply of carbon. This is done by mixing charcoal or other suitable carbonaceous matter, finely divided, with other carbonaceous matter of a pasty or adhesive nature, such as coal tar, pitch, or the like, so as to form a coherent mass.

It is advantageous to add a small quantity of prussiate of potash or other analogous substance having the effect of accelerating the absorption of carbon by iron. This mixture is made into balls having a core of refined metal from a previous charge heavy enough to sink the ball well into the bath. The metal rapidly absorbing carbon will thus be fitted to receive a second charge of oxide for eliminating the impurities without its becoming pasty. The refining may be carried so far that the metal will hardly run, provided it is still fluid enough to receive and envelope the carbonaceous balls. When it is desired to produce refined metal having a low percentage of carbon, the treatment is carried on as above described up to the tapping out of the metal, which is then run into a vessel, wherein it is brought into contact with a further supply of oxide of iron, either alone or with other oxidising agents, so that the proportion of carbon is reduced. By this treatment the crude product of the blast furnace is purified from nearly the whole of its silicon, sulphur, and phosphorus, while the proportion of carbon may be varied as desired. For treating large quantities, it is of advantage to melt in a cupola, and supply from it several refining hearths; and economy is secured by utilising the heat which the pig carries with it out of the blast furnace, for which reason it is advantageous to place the refining hearths near the blast furnace, and to run the metal into them direct.

The refined metal obtained by the process above described may be used for the manufacture of steel in the open hearth furnace or in crucibles, as it supplies a material more chemically pure than the puddled bar made from the same pig, the impurities having been separated while both slag and metal were fluid. As the refined metal may have a low percentage of carbon it can be employed with great advantage in the open hearth furnace, and with a higher proportion of carbon; in crucible treatment its ready fusibility is advantageous in hastening the fusion of the rest of the charge. For either open hearth or crucible operations it furnishes an excellent material for working with iron sponge, as it furnishes the carbon requisite for fusing the sponge in the best form as carbon already associated with iron. For steel processes on the open hearth, in the crucible, or in the converter the refined metal made, rich in carbon, is valuable as a carburiser, which can be employed to any desired extent without imparting manganese, dispensing with the use of spiegeleisen or ferro-manganese. It is also applicable in the Bessemer process when there is an excess of silicon in the charge.

For puddling the refined metal offers great facilities, especially when the puddling is effected mechanically, as in a rotating furnace. In this case the pig-iron is preferably melted in a cupola, run thence into tha refining hearth, and after being refined, while still fluid, run into the puddling chamber. In the charcoal bloomery the refined metal can be treated with considerable economy of fuel and superiority of product, and good castings can be made of the refined metal alone, or mixed with crude pig. Besides oxides of iron, other oxidising agents may be employed in the refining process, but the use of oxide of iron presents the advantage that it gives to the bath metallic iron in quantity sufficient to pay a considerable part of the expenses of the refining process.

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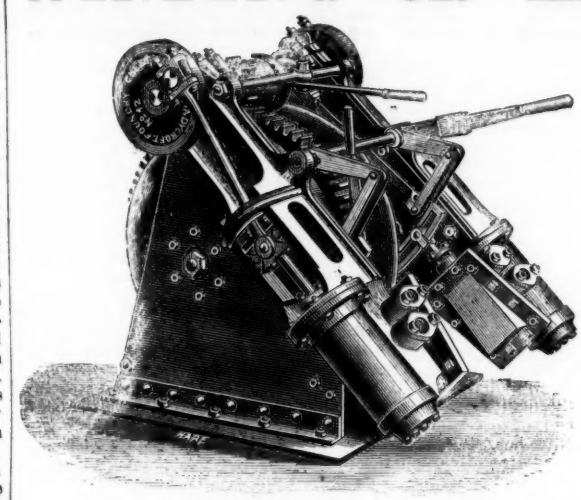

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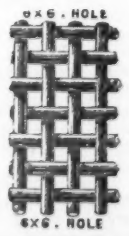

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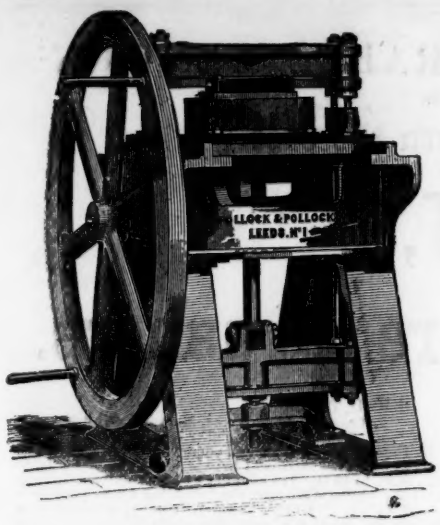

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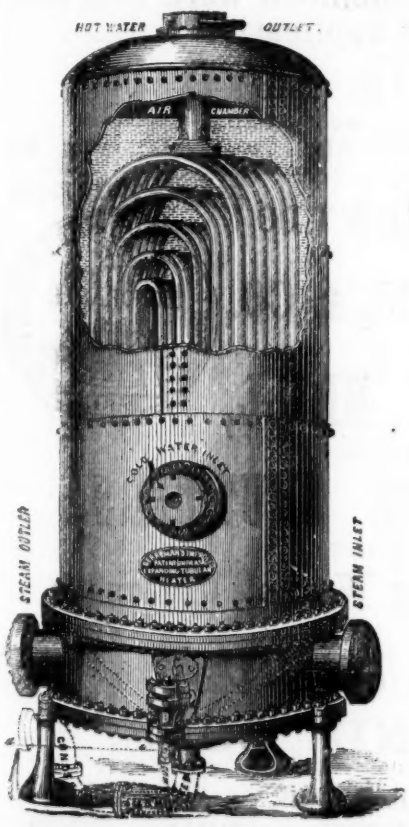

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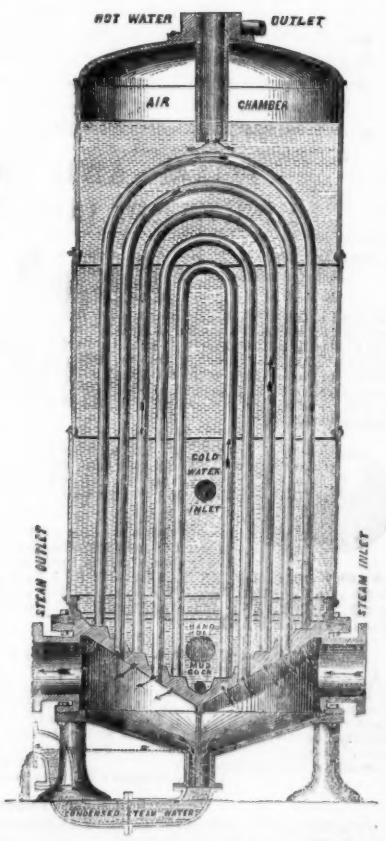

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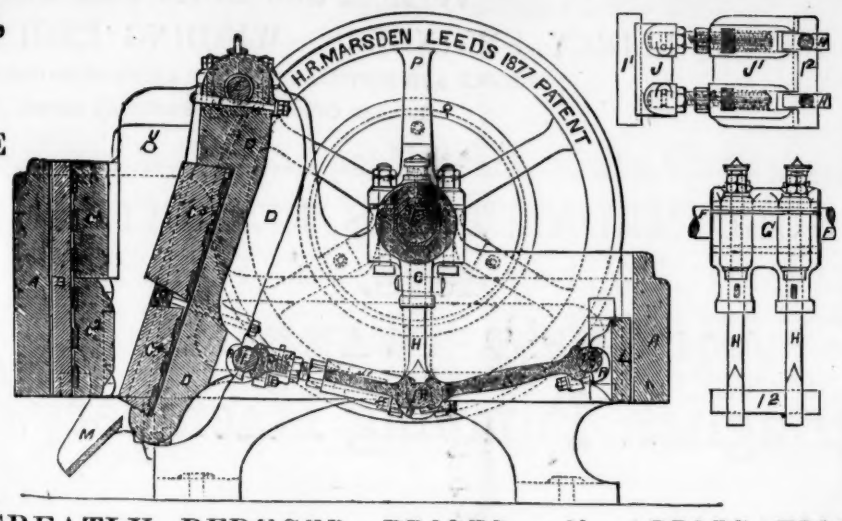

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I am, dear Sir, yours very truly,
WILLIAM MILLER.

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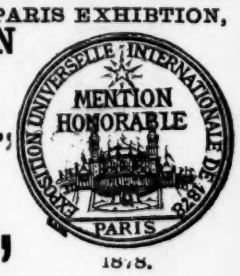

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